

The
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Journal of Surgery

UNDER THE DIRECTION OF THE EDITORIAL COMMITTEE OF
THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

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TABLE OF CONTENTS.

[The Whole of the Literary Matter in THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY is Copyright.]

	PAGE
EDITORIAL NOTICES	2
PERMANENT HEADQUARTERS SITE	3
ORIGINAL ARTICLES—	
THE GEORGE ADLINGTON SYME ORATION <i>C. H. Fagge</i>	5
THE DIAGNOSIS AND TREATMENT OF STONE IN THE URETER .. <i>J. A. Jenkins</i>	21
LATE RESULTS AFTER UNILATERAL URETERO-INTESTINAL ANASTOMOSIS: AN EXPERIMENTAL STUDY WITH REFERENCE TO THE ALLEGED RENAL DISUSE ATROPHY <i>Adolph Bolliger and P. N. Walker-Taylor</i>	33
THE DIAGNOSTIC PROCEDURE OF ENCEPHALOGRAPHY, WITH SPECIAL REFERENCE TO TRAUMATIC FOCAL LESIONS OF THE BRAIN <i>R. Angel Money and Eric Susman</i>	47
SURGICAL TECHNIQUE—	
THE USE OF THE PLANTARIS TENDON IN CERTAIN TYPES OF PLASTIC SURGERY <i>D. J. Glissan</i>	64
A NOTE ON THE LATERAL POSITION <i>H. C. Trumble</i>	68
TREATMENT OF VARICOSE ULCERS <i>C. J. Officer Brown</i>	70
COLON SURGERY: SIGMOIDECTOMY, WITH PRESERVATION OF NATURAL FUNCTION <i>H. B. Devine</i>	76
CASE REPORTS—	
FOUR CASES OF PITUITARY TUMOUR <i>Sir Carrick Robertson</i>	86
TIC DOULOUREUX OF THE GLOSSOPHARYNGEAL NERVE <i>Leonard H. Ball</i>	94
AN UNUSUAL BREAST CASE <i>E. T. Cato</i>	97
AN ABNORMAL RIGHT HEPATIC ARTERY <i>John Turner</i>	98
UNIVESICULAR HYDATID CYST OF THE KIDNEY <i>Richard Flynn</i>	99
SURGERY IN OTHER COUNTRIES—	
SCHMIEDEN'S OPERATION FOR INGUINAL HERNIA <i>104</i>	104
THE SERUM TREATMENT OF PERITONITIS	106
REVIEWS—	
PATHOLOGY FOR GYNÆCOLOGISTS	108
PROCEEDINGS OF THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS—	
ANNUAL MEETING	108

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All articles must be typewritten and double or treble spacing should be used. Each article should conclude with a brief summary and statement of conclusions. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

When illustrations are required, good photographic prints on glossy gaslight paper should be submitted. Line drawings, charts, graphs and so forth should be drawn on thick white paper in India ink. Authors who are not accustomed to prepare drawings of this kind, are invited to seek the advice of the Editor if they are in any doubt as to the correct procedure. Skiagrams can be reproduced satisfactorily only if good prints or negatives are available.

References to articles and books should be carefully checked. In a reference the following information should be given without any abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, date and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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Communications regarding subscriptions and advertisements should be addressed to W. Watson and Sons, Ltd., Watson House, Bligh Street, Sydney.

Royal Australasian College of Surgeons.

PERMANENT HEADQUARTERS BUILDING.

At the fourth annual general meeting, which was held in Sydney on Tuesday, March 31, 1931, Fellows agreed to the proposal that a permanent headquarters should be built in one of the State capitals and, after discussion, decided that, owing to its central geographical position, Melbourne should be selected for this purpose, providing that a suitable site were obtainable. The Council, therefore, authorized the Executive Committee to make inquiries and take any necessary steps consequent thereupon to obtain a site in Melbourne. The Council is now pleased to report that the Victorian Government, as a result of representations made to it by the Executive Committee, has leased to the College the Old High School site in Spring Street for the purpose of establishing there a permanent headquarters. The site is ideal for this purpose, as it is an isolated triangular block, two and a half acres in extent, in a commanding position, adjoining Parliament House on one side and the Exhibition Gardens on the other (see aeroplane photograph). The lease gives a tenure of fifty years, with the option of renewal for another fifty years, for that half of the site which adjoins Parliament House, and a tenure of ten years for that half facing the Exhibition Gardens. A special condition is that a suitable building shall be erected within the next ten years. The College is to pay a nominal rental of £1 per year.

The Old High School building, erected eighty years ago, and modelled on the Old Edinburgh High School, stands upon the site. As this old building has some architectural beauty and is one of Melbourne's historic buildings, it was at first hoped that part of it could be utilized for the College headquarters. Unhappily, it has been found that it would cost approximately £4,000 to put the building into an adequate state of repair for this purpose and, further, that, even after the expenditure of this sum, the building could not be depended upon to serve this purpose for more than ten years. In view of these facts, it is believed that it will be desirable to demolish the whole of the present structure, an inexpensive proceeding, and in its stead to erect a new building. This building must necessarily at first be of modest dimensions, merely sufficient for the present needs of the College, but should be constructed in accordance with a design for a much larger building which will serve all future requirements of the College. The building will naturally be planned with due regard to both dignity and utility. Its Australasian character and symbolic significance demand that it should be at once impressive and artistic. Provision must be made in the plan of the complete building to enable the College to carry out the important functions which it has assumed, namely, the direction of clinical research in surgery, the education of surgeons in the practice of surgery and, ultimately, the administration of the Gordon Craig and Syme bequests. The needs of the individual Fellows must also be considered, as the College must make available to them every form of surgical knowledge. To fulfil these requirements, a lecture hall, class room, a library and museum, administrative offices, research rooms and caretaker's quarters must eventually be incorporated in the building.

Financial considerations will, of course, limit the present building scheme of the Council. It has saved money for this purpose during the five years in which the College has been in existence, but may have to appeal to Fellows to assist it in the erection of the building.



(1) Nicholson Street. (2) Victoria Parade. (3) Evelyn Street. (4) Parliament House. (5) Spring Street. (6) Proposed site for New Headquarters.

THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY

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VOL. II.

JULY, 1932.

No. 1.

THE GEORGE ADLINGTON SYME ORATION.

By C. H. FAGGE,

Senior Surgeon to Guy's Hospital, London; Member of Council of Royal College of Surgeons of England.

I BEAR a message of friendly greeting from the President and Council of the Royal College of Surgeons of England, with their thanks for and appreciation of the honour you have done our College in asking a member of its Council to deliver the first Syme Oration. It is your loss and my advantage that our President has been deterred from addressing you today, and I know that he regards his inability to make the journey to this country as one of the great disappointments of his life.

Your College has been fortunate to obtain so early in its existence an endowment such as the Syme Memorial. This foundation owes its inception to the generosity of the late Lady Syme and to the right sense of filial duty of her family. They knew how deeply your first President was concerned in the welfare of your College, for to no one is greater credit due for its successful launching and subsequent development than to him.

In honouring Syme's memory, his widow and family have set a noble example of service to your College: for this gift is conceived in exactly the same spirit as that which guided him in its making.

We are met today under the terms of the Syme Endowment to recall the chief incidents of the life of George Adlington Syme, to do honour to his memory and to endeavour to derive from his career an example which it will profit us to follow.

Syme's father, George Alexander Syme, a Baptist minister and journalist, was born in Scotland, and on September 15, 1850, married Susanna Goodier, of Manchester, a quakeress, at the Evangelical Friends' Chapel, Chorlton, when each was about thirty years of age. No doubt many of those who knew your first President will trace to this parentage some of the salient features in his character and personality. We have

evidence of his birth, in the year 1859, at Sherwood Rise, Basford, then a rural retreat outside Nottingham, but long ago swallowed up by the extension of that city. Some three years later the whole family sailed for this country, settling in this city, where one of Syme's uncles¹ was already established as proprietor of two newspapers.

We know that his early career at Wesley College, and later at the University, was peculiarly distinguished, and, in fact, his record steadily became more and more brilliant as the years of his undergraduate training went by.

1859. BIRTHS in the District of Basford				in the County of Nottingham			
No.	When Born.	Sex, & age.	Age and Residence of Father.	Name and Maiden Name of Mother.	Rank or Profession of Father.	Parents, Grandparents, and other Relatives, and Where Brought up.	Signature of Registrar.
74	July 1859	George	George Syme	Elizabeth Syme	Farmer	Basford, Nottingham	1859 Registrar

At the age of twenty-three he had graduated in medicine and surgery, and was thus fitted for a year's tenure of the post of resident medical officer in the Melbourne Hospital.

Syme was either happy in his choice, or fortunate in the circumstances which, after he had obtained his medical degree in the University of this city, prompted his return to the Mother Country in 1883.



King's College.

The greater part of the next two years was spent at King's College Hospital, and there can be no doubt that he chose that hospital in order to obtain first hand knowledge of the practice of Lister, who during some five years' work in that institution had firmly established his principles of antiseptic surgery. Lister had

already charge of beds, and was second on the surgical staff only to John Wood; for he had not worked his way up from the bottom of the staff in the ordinary way, but had been invited to accept a position on the full staff to fill the vacancy caused by the death of Sir William Ferguson in 1877.

¹ In the "Dictionary of National Biography" is a life of Ebenezer Syme, 1826-69, colonial journalist, son of George Syme, schoolmaster at North Berwick State School. . . In 1852 he emigrated to Victoria and wrote for the Melbourne *Argus*. Later he was joined by a younger brother (this must have been George Alexander Syme), and purchased the Melbourne *Age*.

It will be remembered that Lister, a quaker, married Agnes, eldest daughter of his first chief in Edinburgh, James Syme; this happy union with one outside the body of Friends was the cause of Lister's resignation from its membership. He discarded their dress and his doorplate bore the title "Mr. Lister", in place of "Joseph Lister", which, had he remained a Friend, would have been his correct designation. It is natural that the question should arise whether the subject of this lecture was in any way related to Lister's father-in-law, the distinguished Professor Syme, whose amputation will carry his name down to posterity. So far as I have been able to pursue inquiries on this matter, I am unable to find any relationship between the two Symes. Nevertheless, we can well imagine that there would be a ready sympathy between Lister, the quaker, and Syme, the son of a quakeress, from whom I am told he inherited much of his temperament.



From a painting of Lister in the possession of the Royal College of Surgeons of England.

At that time clinical lectures were given at King's weekly by Wood and Lister, and it is worth noting that each was a fellow of the Royal Society.

In due course, Syme became a member of our College, and later we find his signature in the register of Fellows, under the date of November 30, 1885.

George Adlington Syme.

In 1887 he returned to Melbourne, and soon applied himself to anatomy, which he taught as demonstrator and later as lecturer for the next eighteen years. In this he followed the custom of his day, which regarded a long course of teaching descriptive anatomy as the one supremely necessary preparation for a surgical career.

In the same year, at the age of twenty-eight, he became surgeon to the out-patients' department of the Melbourne Hospital, and about the same time was appointed pathologist to the Women's Hospital. He served the Melbourne Hospital actively until 1919, when he attained the age of sixty, and joined the consulting staff, after an unusually long period of office, first in charge of out-patients for sixteen years and afterwards of in-patients for a similar term. During this period of his active life there was no aspect of medical interest in which he did not take his full share.

One of his especial cares was the Victorian Branch of the British Medical Association, and his work for this body, which began in 1897, culminated in 1908 when he was elected President, his first term of that office.

When we look at his somewhat stern face at rest, we find it hard to visualize a side of his character which was much in evidence in his dealings with the British Medical Association in this State. Only an occasional smile reveals the depth of his sympathy and human kindness which is concealed so often by the dourness of this man of affairs. Yet as a peacemaker, Syme laboured long and patiently for the British Medical Association, with the result that, in association with similar work in the other States, it has enrolled a very high percentage of the members of our profession in these Dominions, and has become the bond which links together the varied interests which medicine comprises.

Similarly, he worked as trustee for the Medical Society and was a member of the Council of the University of Melbourne. In his ten years' editorship of the monthly journal, then known as the *Intercolonial Medical Journal*, Syme no doubt followed an hereditary instinct: we are told that he had the power of rapid work, of quick thought and of clear expression of ideas in few words. We can feel assured that as editor he aimed at and exacted from others a high level of performance, and that there was little evidence of slovenly writing or careless editing while the journal was under his control.

At the time of the outbreak of the Great War, one of Syme's many activities was the work of the Federal Committee of the British Medical Association. On the formation of the Australian Imperial Force, Syme volunteered for service in any capacity and finally left this country for Egypt and Gallipoli as chief of the surgical staff of Number 1 Australian General Hospital.

The bare facts of the nature of the work, the difficulties which had to be overcome, and the resourcefulness which was displayed, are disclosed to us in a paper relating his experiences, but, reading between the lines, it is evident that his sensibilities were appalled by the senseless mutilation of war.

His mind must have been staggered by the injuries inflicted on bodies which, without any fear of contradiction, I describe, as I have often done, since it was my privilege to minister to some of the Anzacs at the Hampstead Military Hospital, as perfect types of humanity. We may well wonder, in an age in which your countries had managed to breed a race of men of extraordinary physical perfection, how the statesmanship of those who controlled the Powers in 1914 was so primitive as to allow a dispute capable of settlement by arbitration to pass to the arbitrament of modern warfare.

Syme's active service on the near Eastern Front was cut short by a severely infected hand, owing to which, for a time, his life was in danger, and later it was feared that if his hand could be saved, its usefulness would be much impaired.

Before the end of 1915 he was home again and working as consulting surgeon to several military hospitals: he also resumed all his old activities, such as membership of the Federal Committee of the British Medical Association.

Great labours devolved upon Syme after the war, when he was asked to be one of the original members of the medical committee which advised the Repatriation Commission.

About this time he retired from the active staff of the Melbourne Hospital, and soon afterwards was elected President of the Victorian Branch of the British Medical Association for the second time. In 1923 he was President of the first Australasian Medical Congress (British Medical Association), in the reconstruction of which he had taken a leading part, his aim being to bring the profession together under the influence of the British Medical Association. In 1922 he became Chairman of the Federal Committee and in 1924 was nominated by the Government to be a member of the Royal Commission on Health. This year was a notable one in his career, for on retiring from active practice he was the object of a great public demonstration, on the part of the lay as well as of the medical world, when the Victorian Branch of the British Medical Association determined to establish a triennial lectureship to commemorate his services to surgery, the profession and the community. His Majesty created him a Knight Commander of the Most Excellent Order of the British Empire, and his portrait which, by the courtesy of the British Medical Association, we are permitted to have here today, was painted by Mr. (now Sir) John Longstaff.

And now towards the end of his active life we come to his part in the creation of your College.

He had done so much to establish the British Medical Association as an all-embracing force in every part of the profession in this country, that it was not unnatural that he should be suspicious of the influence which a new professional body would exert. But when he became convinced that the establishment of a College of Surgeons was desirable, the project had no more ardent an adherent, and I doubt if any other surgeon in this country could by his personality have influenced others as did Syme in his espousal of this momentous development in the surgical history of these Dominions.

To Cicero is attributed the self-laudatory belief in the good fortune of Rome in being born during his consulate¹: we can certainly congratulate your College on being born under the wise guidance of George Syme.

One of his last papers, "On the Aims and Objects of the College of Surgeons of Australasia",⁽¹⁾ provides a convincing testimony of his enthusiasm for the College, for it contains a closely reasoned argument, not only for the institution of the College, but also for the method by

¹ *O fortunatam, natam me consule Romam!* This is the only verse written by Cicero which has come down to us. His prose was obviously far better than his verse.

which it was done; this could have been written only by one who was himself in entire agreement with the policy adopted.

In an appreciation of the late J. B. Murphy, Dr. William J. Mayo⁽²⁾ sets up in the following order the attributes by which a surgeon must be judged: (i) originality, (ii) teaching by word of mouth, (iii) teaching by the printed word, (iv) surgical judgement and operative skill.

We cannot claim for Syme the discovery of any great surgical principle or pioneer work in the research of the operating theatre on any hitherto unexplored organ of the human body. His surgery was careful, sound and sure: everyone working with him felt that his judgement, if tending to err on the side of caution, would be fully justified by the upshot to his patient.

Under the above headings, his greatest claim to distinction is as a teacher of the spoken word, for he made little use of the written word as a means of conveying his ideas to others. This tendency was due, we may infer, to an innate modesty, perhaps one may call it a slightly over-developed critical faculty which constantly reminds its possessor that the message which he is about to convey is no heaven-sent truth hitherto unsuspected and unknown.

I have not been able to survey completely Syme's clinical writings, for some of these, even when published, were not available in English medical libraries. Though his writings are not many in number, those which I have read embrace many subjects and display unusual clinical insight.

To me he appears happiest when writing on some non-technical matter. For example, an address which he gave in 1905 as President of the Section of State Medicine at the Australasian Medical Congress, deals with a very wide range of subjects of medical interest, and from the extensive nature of its references to other writers displays unusual acquaintance with classical and modern Continental literature.

As a teacher he excelled in clinical, bedside demonstration, rather than in the lecture theatre; his method, based more on clinical insight than on exhaustive knowledge of surgical literature, was primarily of value to a man in practice when faced with a surgical problem, though perhaps less useful to a candidate at one of the higher surgical examinations.

We read that: "He was a wonderful teacher and his pupils worshipped him." We can only envy those who were fortunate enough to be his pupils, for they will ever retain some characteristic phrase which will on all occasions come to their aid in difficulty and, in addition, will provide a pleasant reminder of their indebtedness to the master's powers.

His memory enabled him to recall the salient features of interesting cases with accuracy and in due sequence; his diagnosis was founded on logical argument in which Butler's aphorism that "probability is the soul of life", was upheld by every word.

But in our estimation of a human being, we cannot separate the craftsman or scientist, however specialized his life's work may be, from

the man himself. Every act, every judgement, must be the mirror of his character, must be tinged with his personality, and, if I may venture to add to Dr. Mayo's attributes of a surgeon, I would place first and, in my judgement, first and the rest nowhere, the attribute of nobility of character.

In all his dealings with his fellow men, be they patients, colleagues or subordinates, the character of a surgeon is in constant evidence; it directs his decisions, it influences his judgement. Syme would not have been the first President of your College had not his sterling character been the outstanding feature of his personality.

Thank God, Syme had his enemies: his make-up was not that of the ideally meek Christian. When necessary, he could fight and from his Scotch origin it may be surmised that his blow was no mere verbal caress. In the incubation stage of your College, Syme took no leading part; he was, in fact, one of the latest of the leaders of surgical thought in this or the adjacent islands to espouse this cause. But, having come into line, he soon staked his claim as a candidate for the presidency by the sanity of his opinions, the caution of his judgements and the unvarying common sense of his conception of what your College should stand for.

Syme was a man whom everyone instinctively trusted; even those who were not in agreement with his views knew full well that under his rule their own opinions would be given full weight, more particularly as they were not those of him who held the scales. His integrity was never in question.

It was owing to the personal appeal which Syme's character made to all the other surgeons in these Dominions that, without any disparagement or injustice to others, the choice for president first fell on him. And it may be maintained without fear of contradiction that the event more than proved the wisdom of this selection.

The incubation period of such an institution is usually tempestuous: a course has to be shaped, principles established, ideals outlined. It is scarcely possible that all the members of the body to whom these duties are entrusted should see eye to eye on all questions which come before them.

When differences occurred, Syme controlled the situation tactfully: he kept his mental vision on the principle to be established and, whenever possible, yielded in the method by which it should be attained.

But on occasion Syme could be obdurate: for when he felt that a principle was involved, nothing would move him towards compromise: again, he did not suffer fools gladly, and anyone who he considered was wasting the time of a committee by the introduction of frivolous or irrelevant talk, would be courteously, but none the less firmly, brought back to the matter at issue.

The history of the inception of the Royal Australasian College of Surgeons is sketched in the handbook recently published, and it is interesting to me to note that the idea of establishing such a college in Australia and New Zealand originated in the year 1920 with the first

Fellow of the Royal College of Surgeons of England to practise in New Zealand, my friend, Sir Louis Barnett. His proposal at that time was to establish a college or association of surgeons linked up in some way with the British Medical Association.

A majority of the members of the British Medical Association did not approve of the proposal, but a useful minority, composed it need hardly be said of surgeons for the most part, kept the project steadily in view, and five or six years later a fresh and successful effort, sponsored by Sir George Syme, R. Hamilton Russell and H. B. Devine, brought the College actually into being.

It must be remembered also that the visit to Australia and New Zealand in 1924 of Dr. Franklin Martin, and Dr. W. J. Mayo, distinguished representatives of the American College of Surgeons, had a definitely stimulating effect, not only on the question of founding your College, but also in its actual constitution, which has been so modelled as to combine as far as possible the virtues of those of the English and American Colleges.

Under this constitution a provisional scheme was adopted which should be in force for five probationary years: this probation is now over and, in passing, I may perhaps venture to congratulate those at the helm on the tact with which they have overcome difficulties, and upon the success which has crowned their efforts. Opposition was natural; if the ethical principles for which the founders stood required enunciation, and it was to be an absolute requirement of any Fellow that these principles should be strictly adhered to, those whose conduct did not reach the high standard required would certainly protest. Under the wise guidance of your late President, much of the early opposition has been overcome; in fact, in many quarters former enemies have turned to friends, and some of the fiercest critics have signed their names under applications for your fellowship.

So far, all is well; your College having passed through the embryonic stage, has now come into the world, a new-born babe, with all the privileges and rights of life to look forward to—yes, and all its duties and responsibilities. The greater, the more real the success of the past five years has been, the weightier is the burden of responsibility which you have now to shoulder, and it may be worth a few minutes' study to consider what your principal responsibilities are and to suggest methods of meeting them.

In the first place, I wish to discuss for a moment the method of election of Fellows to the roll of your College. The original forty Founders, having constituted themselves a College, made a selection of those who from their position and qualifications appeared to be most suitable, but from this year on your College will require from an applicant for fellowship the acquisition of one of the higher surgical degrees and evidence of personal experience in the shape of records of operations performed and papers written.

The method of your original foundation is, of course, without question the only plan by which such an institution as a college of surgeons can be founded; it has followed fairly closely the method of formation of our College, and some of the best features of the constitution of the American College of Surgeons have been later introduced.

This digression is really a plea, which I have no right to urge, that you will give the matter very careful consideration before you alter in any radical direction the method of election which has recently come into force. The next step can only be to replace your present method of selection on the evidence of academic merit and of work done by one of examination.

In the course of the past twenty years, the views on examinations which I gained as a student and teacher have been modified by experience acquired as an examiner.

I must confess that the modern examination is far from perfect as a means of discovering what a candidate knows, especially when the usual tests of written and oral examinations are, as they would be in this instance, applied to a candidate when it is particularly desired to discover whether he has acquired practical knowledge of his craft, and how he would proceed to deal with any emergency demanding courage, quick thinking and ingenuity.

It may be that my views are jaundiced, but I am inclined to believe that the present path to your fellowship as laid down in your constitution is, or perhaps I should say is capable of being, a better, a truer method of selection of the right and proper person than the time-honoured method of examination. This latter not only favours a stereotyped mental make-up in the candidate, but also requires a very well trained and well equipped mentality in the examiner himself, a fact which we, as examiners, are too prone to lose sight of.

I hope it may not be an impertinence on my part to point out that any examination which could be devised for your fellowship would merely be a duplicate of that already existing for the mastership of surgery of any of your universities. For this digression my excuse must be a desire to save you from the extremely unsound educational position which hampers medicine in Great Britain owing to the multiplicity of examining bodies.

From the exordium contained in your constitution adopted at the first meeting of founders in 1927, we learn that it is the opinion of your Council that facilities should be provided for the higher education and advanced technical training of surgeons and surgical specialists.

What do these general terms imply? What are the fundamental requirements in the training of a surgeon?

I will refer only to those requirements which seem to have come into existence or to have acquired a relatively greater importance since I worked out my own apprenticeship. As a student, one is too prone—at least I was, and I have ever noticed a like tendency in others—to regard each subject in the curriculum as a closed compartment, to be

finally shut and locked for ever when one has satisfied one's examiners in that particular subject. So the premedical subjects are largely forgotten by the time they are required for the elucidation of clinical problems. The interdependence of medicine and surgery has gradually been realized, but only in recent years has premedical education been adequate to the later needs of the clinician. Modern surgery, no less than medicine, depends to so large an extent on delicate investigations that a surgeon often finds himself endeavouring to obtain a working conception of modern scientific methods of diagnosis with an inadequate knowledge of the basal sciences of chemistry and physics. What is true of these sciences is true of every branch of medicine: I have often said that I read more medicine than surgery, and I often have reason to regret that I had no practical knowledge of gynaecology in my student days.

We have learned from Syme's career that he spent a considerable slice of his life in the teaching of anatomy. This was possibly unavoidable owing to the necessities of the times, and while with reason a few years' teaching of this subject is generally regarded as essential to the equipment of a surgeon, it should not be allowed to take up time which could be more profitably employed in acquiring other necessary knowledge. Quite apart from the fact that the expenditure of several years in the routine teaching of such a subject to students is the most potent method of extinguishing originality of expression and ideas in a young man, it may well be considered whether the displacement of anatomy by physiology as a path to surgery should not more often be varied in favour of biochemistry, which, as years go on, takes ever a greater part in the mental equipment necessary for preeminence in all branches of medicine and surgery.

Forty years ago the operative output of a large hospital was but a small fraction of that of the present day—then a young surgeon had few chances of carrying out operations which now are everyday occurrences. It has therefore naturally followed that the pendulum has swung to the other extreme, and the young surgeon of the present day is inundated with opportunities for operating himself, when in many cases he would profit by acting as assistant to an experienced surgeon. There is in my judgement an over-searching for operative experience by the young surgeon of the present day. This naturally tends to stress the importance of operative dexterity—one of the more showy and less valuable attributes of a good surgeon.

A surgeon who has comparatively few early chances to operate will become, when his opportunity arises, as good an operator as he is capable of becoming: no early opportunity can convert an average operator into a heaven-born manipulator, nor can a great technician be reduced to the ordinary level owing to lack of early operative experience.

When I say this, please do not let me be misunderstood. I have seen the days when the chiefs of what are now regarded as the surgical specialties, were recruited from the ranks of physicians.

I served an apprenticeship in aural surgery, and from personal experience can assert that London was not by any means the only European capital where the sight of mild hæmorrhage utterly unnerved a specialist of world renown whose general surgical training was defective. I feel very strongly that everyone who is training for a special branch of surgery, should have several years of practical work in general surgery.

Another reason why I am inclined to deprecate this present craze for operative experience is that the young surgeon of the present day is inclined to spend time on the performance of a multiplicity of common and uninspiring operations which he should more profitably employ in other studies which cannot be postponed to a later date.

The capacity to carry out a piece of laboratory research which is of any real value, is given to very few. Nevertheless, I feel very strongly that opportunity should be given to every young surgeon to put the question to the test.

In our College, under the inspiring and self-effacing guidance of the Conservator, Sir Arthur Keith, much original work has, in an unobtrusive way, been carried out for many years past, but in the last five years, with Lord Moynihan at the helm, fresh ground has been broken.

To the vision and generosity of Mr. Buckston Browne, the well-known specialist in the surgery of the kidney and bladder, who was recently honoured by His Majesty, we are indebted for a Research Farm at Downe, and by the kindness of other benefactors we have been able to maintain three research scholarships in the College.

I mention these facts chiefly as an illustration of my previous statement, that success engenders increased responsibility. An institution such as a college of surgeons cannot stand still, and those responsible for the guidance of its destinies must ever be on the lookout for indications or suggestions made by the progress of knowledge that its activities should extend more widely for the good of humanity.

Admittedly, only one of many researchers is able to make an appreciable addition to knowledge, but such work stimulates the critical faculty and shows the value of careful methods and of clear reasoning in an attempt to solve any problem.

It is not my purpose to champion either side in the controversy in which some members of our profession at home have been engaged, on the relative values of laboratory research and clinical observation, but I feel that sufficient stress has not been laid on the points that every clinical observation has an aspect of research and that every operation is a research which often demands, but in a higher degree, just those qualities exhibited by laboratory workers.

Your College has done well to establish at the outset the principle that it stands for progress by the allocation of part of the Syme Endowment to research as the Syme Surgical Research Scholarship.

Already the noble example set by Buckston Browne in our College has been emulated by a munificent bequest to your College by one of

your founders, the late Robert Gordon Craig. The wisdom by which your College is given complete discretion in the use of this legacy will provide an excellent precedent for the guidance of future benefactors. It is my hope that this bequest may be expended in providing a centre for research in such a spot that your future College may develop around it; but many considerations must be taken into account before a decision can be arrived at on such a matter.

Here is one of the problems, which, as I have said, the responsibilities of your success will at all times impose on you, requiring foresight and possibly wise sacrifice. It may be that this is one of the occasions in your history to make the greatest demand on your vision, and most potent in determining your future.

Your President and Council must have ever in view the importance of acquiring a home worthy of your College. This should, in my judgement, be in one of the surgical centres in this country, for to establish a college at a distance from medical activity and away from opportunities for clinical investigation would do much to jeopardize the proper fulfilment of your ideals.

Such a centre must develop on accepted lines in so far that it should possess a museum, and personally I doubt if it is possible to desire a better model for this purpose than that of John Hunter in Lincoln's Inn Fields. Workers in all branches of surgical pathology have need of books of reference, so a well-stocked library will be essential. It is my hope that here will be the home of the Syme Surgical Research Scholar, under the wing of one of your chief officers, with access to a good library, and above all in close touch with "disease in the living", so that whatever line of investigation he may be pursuing, he will be able constantly to check his laboratory conclusions by observations on patients.

It must be remembered that those who in this matter, for the good of the Dominions and for the advancement of surgery, waive their own personal desires, and perhaps sacrifice something of their personal ambitions, will establish a great claim upon the gratitude of posterity.

I rejoice to see in the forefront of the requirements for your fellowship that the applicant shall have manifested his interest in the work of other schools, by having passed a reasonable time in visits to surgical clinics beyond the limits of this country.

My probationary period coincided with a time of extreme complacency in matters surgical in England, particularly in London. It was said to be the cherished belief of one surgical staff that nothing worth knowing was done outside the four walls of their hospital, and, as a fact, very few of my teachers knew anything of continental clinics and possibly less of the work of other surgeons in their own city. When, in the very early years of my probation, on the advice of a farseeing teacher and friend (Sir Cooper Perry), I roamed from Guy's, through Germany and Austria, I can recall the ominous warning of one of the more reactionary members of the staff, that I should not be away so long as to be forgotten!

Not the least of the considerable contributions which my President, Lord Moynihan, has made to surgery in its widest sense, was the institution of a Surgical Club, whose chief function was to travel as a body to British and continental clinics. So members came to visit one another's hospitals as an everyday occurrence. Thus many friendships grew up, but even when opportunity fell far short of this, the conception of another surgeon's work, from having met him once or twice and perhaps from having heard his views in some discussion, often led to an amity of outlook which would not otherwise have obtained.

This conception has gradually expanded with the formation of the Association of Surgeons of Great Britain and Ireland, the roll of which contains the names of 250 men who practise surgery. Only recently twenty-five associateships have been added to cater for the needs of young surgeons who are not yet on the permanent staff of any hospital.

The meetings of this body have met with ever increasing success, and the personal contact of surgeons from all parts of the British Isles with one another has been invaluable.

Your Council has done well to arrange for annual meetings of your Fellows, for the reading of papers and for discussions on surgical subjects. For meetings of this kind two rules might make for a freer interchange of ideas: firstly, that all papers should be spoken without notes, not read; secondly, that no reports should appear in the medical press. No doubt your Council has considered these points, but I venture to suggest that at least the second point might occasionally be applied to the discussion of a subject on which a frank expression of surgical opinion was desirable in the public interest.

In an address to which I have already referred,⁽¹⁾ Syme put forward as a reason which had weighed with some in rendering the establishment of your College desirable, the extensive performance of operations by insufficiently trained surgeons.

I conclude that this epidemic is, as with us, an aftermath of the Great War, in which at first universally, and at many times in individual places, the demand for surgical skill outran the supply. Men with defective training began to do operations and found that it was surprisingly easy to carry out some, in fact most, stereotyped operations in a manner which did not, at the time, appear grievously inadequate, and of which the results were not strikingly dangerous.

Unfortunately, surgery does not lend itself to a rigid choice; it is quite true that most surgeons select cases on their list which they delegate to their junior colleagues, but no surgeon can, singlehanded, ever undertake a case with a certainty that the procedure required will be easy and straightforward.

It is, of course, true that we all, not only in our youth, but even in our ripe old age, have at times to undertake operations which our training has not warranted us in dealing with, but if a launching into the unknown were never attempted, no surgeon would be trained and no progress assured. It is obvious that the middle course satisfies both

requirements. Let no man undertake independent surgery until he has had a sufficient period of training as an assistant to a surgeon. It should be part of the duty of the latter to give his assistant operations of increasing difficulty to perform, when the surgeon would assist and possibly after the operation had terminated, offer personal opinions.

This method is to the advantage not only of the patient, but also of the man who is being trained.

For this reason I feel that the regulation for your fellowship, which requires not only a year's service as a house surgeon in a recognized hospital, but also a year's training as a surgical assistant, is a very wise one.

It is not my purpose to raise questions of controversy or to endeavour to teach you how to manage your own affairs, but I have referred to this point as, during my period of ten years as a member of the Court of Examiners of the Royal College of Surgeons, the question of requiring of a candidate for the F.R.C.S. such a period of residence in a surgical post has often been debated and, I regret to say, always been negatived.

It is difficult for me to have a considered opinion on the regulations which have been framed for the ethical control of your Fellows. I think more is to be gained by general consent, and by the establishment of a code which tacitly indicates that such things are not done, than by any endeavours to frame penalties to meet varying defects of conduct. These problems must arise in human affairs and consideration shows that honesty, that is a correct professional attitude, has its commercial value.

It must be admitted that probably most of us are honest because we have never been tempted to be anything else, and scarcely anyone would be so confident of his moral self as to foretell what line of action would be his in a dilemma which involved the question of immediate personal advantage. But departure from correct ethics must be dealt with, abuse must be righted, perhaps primarily because probity of conduct in professional life is imperative if the confidence of patients is to be retained.

Further, just as the character of a profession, trade union, or of any other collection of men is determined by the character of each individual comprised within it, so is the national character formed and estimated by the level conduct of the bodies of which it is composed.

The spirit of Australasia demands that each of her citizens shall walk in the path of truth: your College can make no less a demand from each of its Fellows.

Here we have clear guidance from Syme's life: let each one ask himself in any ethical difficulty how Syme would have behaved, or what course he would have approved of in another. Such will be the course of right behaviour and, however hard, it should be followed.

In June, 1928, the Council of the Royal College of Surgeons of England was informed officially of the formation of this College, and in reply sent an address in which the hope was expressed that it would "fill a position beneficial alike to the profession and to the community".

The letter concludes: "We trust that your College may strengthen the bonds that already unite the medical profession in this country and in the Dominions beyond the seas." Since that date you have had visits from three members of our Council, so that it is unnecessary further to emphasize the interest which the College of Surgeons of England takes in your fortunes.

The most recent event which I venture to claim has done even more than was expected of it to cement our two Colleges together, was the visit of our examiners to conduct the first F.R.C.S. examination in this city. It is much to be hoped that the request from your College for a second visit may result in an extension of the examiners' trip so that similar facilities may be afforded to New Zealand students.

It was never expected that visits of English examiners to any of the Dominions would be a paying proposition. Your College most generously shared with us the deficit entailed by the recent examination, but I think I may say that many of our Council would agree with the opinion which I hold very strongly, that even if the pecuniary loss had been greater, it would have been more than compensated for by the cordiality which it has produced between our two Colleges.

I hope no one in these Dominions will ever for a moment imagine that examiners have been sent from England in order to obviate the necessity of your College setting up their own examinations. Nothing can be farther from our wishes: it was made clear from the very beginning of our negotiations with the Canadian College that if and when it was desired to establish a Canadian fellowship we should be in complete agreement with the project, and should not expect further invitations to examine for the first F.R.C.S. of England in that country. And I need scarcely add that our feelings are exactly the same in relation to any plans which your College may make in the future.

A scheme is also on foot to bring about a working agreement of interchange between the journal of your College and *The British Journal of Surgery*: it is by no means improbable that difficulties which at the moment appear of some magnitude may be overcome and a further bond of professional union established between the surgeons of your Dominions and those of the Mother Country.

My Council is very proud of the fact that your first President was one of our Fellows, and realizes that the present most cordial relations which exist between the two Royal Colleges of Surgeons are largely due to his tact and conciliatory spirit.

In 1920, as President of the Victorian Branch of the British Medical Association for the second time, Syme, in his address,⁽³⁾ urged that: "A medical education ought to be as efficient an equipment for public life as any other." The call to men of education, refinement and culture to take their part in public life was never louder, never more insistent than it is today, when, not only at home, the uneducated by the powers which increasing ranges of suffrage have given them, threaten even national existence by ignoring primary economic principles.

As a profession we have been too prone to escape from such obligations by asserting that either their performance was impossible owing to urgent calls, or politics should have no part in a professional man's life.

If we claim to possess in medicine brains equal, if not superior, to those of the bar and of the other professions from the ranks of which politicians are mainly recruited, have we any right to deprive the State of help which our leaders can offer in advice and direction? Though to each one is not given the opportunity or perhaps the temperament for public service, there is no need for any surgeon desirous of taking part in some form of non-professional work to step into municipal or political life. There is in every town so great a need of willing workers, to run medical societies, edit medical journals, or to administer benevolent funds, that no one can excuse himself of a duty which I submit each one owes the State and to his profession, on the grounds that no opportunity exists for the exercise of such activities.

The address to which I have referred begins with a characteristic article of Syme's faith. "We are all proud of the fact that we serve at all times and all seasons."

His life exemplified to the full the saying that "service is the key to happiness".

It is so true that all one knows of any man is a small part of his surface. Syme's surface seemed serious: he was usually silent, often monosyllabic, almost stern. Yet he had artistic sense above the average, and his greatest pleasure came from works of beauty.

He took an unconcealed delight in mild frivolities which on slight acquaintance seemed so foreign to his nature, and at times displayed an unexpected charm and sociability.

In his home your two countries were united, for he had married Miss Berry, of New Zealand. We may hope that the union of the two Dominions in this College will result in as continued a happiness as that which welcomed one in the Syme's home life.

All speak of Syme as a man of intense honesty of purpose, hating deceit and demanding in others a rightness of conduct scarcely less than that manifested by himself.

Among his professional brethren of this country his claim to honour is that of the medical statesman of the generation, wise in counsel, prudent in conduct, tactful in method. One cannot choose for him a better epitaph than the words with which he opened his British Medical address in this city in 1920: "*Ich Dien*."

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THE DIAGNOSIS AND TREATMENT OF STONE IN THE URETER.

By JAMES A. JENKINS,
Dunedin, New Zealand.

THE diagnosis of ureteric calculus may be made fairly readily on clinical grounds in a case presenting the classical picture, but I do not propose to discuss this here. I would, however, stress one or two points.

A calculus may be passing down the ureter and, in so doing, cause sufficient damage to induce gross hæmaturia, and yet the patient may



FIGURE I.



FIGURE II.

make no complaint of pain. Figure I shows a calculus which was proved to lie in the upper end of the right ureter by a second skiagram (Figure II) taken after the introduction of opaque material into the ureter. There was gross hæmaturia, but no complaint of pain. The ureter was not obstructed by the calculus.

Obstruction of the ureter (obstruction is used in the sense that no urine is able to pass the stone) due to calculus may be quite painless, although there may be considerable distension of and tension in the renal pelvis.

The case illustrated by Figures I and II is an example, as the calculus a week or so later became impacted in the ureter and completely blocked the passage of

urine and catheters past the stone. Operation was performed, and the stone was found to be very tightly gripped by the ureter, whilst the ureter and pelvis of the kidney were dilated with fluid under tension above the point of obstruction. At no time was there pain.

Figure III shows a calculus in the lower part of the ureter on the right side. *A* shows a catheter touching the stone, and *B* one of the methods used for dilatation of the ureter.

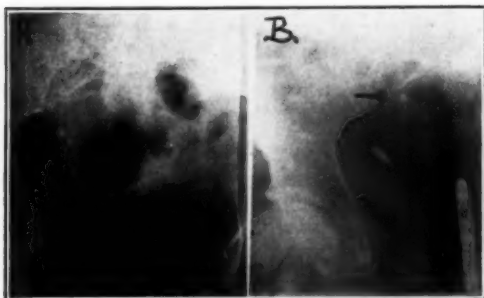


FIGURE III.

This calculus caused no pain, but at times there was a vague discomfort. The patient had previously passed a large calculus from the left ureter after meatotomy and dilatation.

Another patient gave a history of severe pain some weeks previously. Cystoscopy showed no dye coming from the left kidney. An opaque catheter was obstructed at the level of the shadow, as shown in Figure IV. Attempts to effect the

passage of the stone with instruments failed, and, as there was no excretion of urine down the ureter, operative removal was undertaken. The kidney and ureter were found distended and tense. At no time during this complete obstruction of the ureter was there any pain.

A patient may have a stone either in motion or arrested, with or without obstruction, and may suffer the most intense agony. Here I



FIGURE IV.



FIGURE V.

would point out that gross intraperitoneal lesions such as perforation or obstruction of the bowel may be simulated subjectively and objectively.

As an example of this, I may refer to a patient who complained of left renal colic with intense pain. All skiagrams failed to demonstrate a calculus. A wax bulb revealed a scratch, and a calculus was passed after dilatation of the ureter. Colic recurred next day, and the wax bulb showed another scratch and another calculus was passed. A third calculus was detected by the bulb method and was passed.

Figure V shows a calculus which caused intense intraabdominal symptoms, yet the obstruction of ureter, the situation of calculus and distension of and changes in the renal pelvis were identical with those that characterized the case illustrated by Figure I, in which there was no pain.

Chronic intermittent discomfort or vague pains in the abdomen or back may be caused by calculus.

Figure VI illustrates a calculus for which the patient was kept two years in and out of hospital before I first saw her. After dilatation of the ureter and passage of the stone all symptoms disappeared. The figure is also of interest in that it shows the migratory qualities often present with this type of stone.

I would stress the importance of recognizing that there are numerous causes for renal and ureteric colic other than stone. The reader will find these set out in any good textbook. If one reviews the varied symptomatology of ureteric calculus and the even wider range of causes of colic and ill-defined pain arising from the urinary system, one is forced to be very careful in arriving at any conclusions if complete urological investigation has not been made. On the other hand, with proper equipment and training, findings and conclusions can be more definite here than in perhaps any other branch of surgery.

What shall be our method of attack when a patient presents himself? If he is in severe pain, it is useless to attempt investigation until opium derivatives and atropine have rendered cooperation possible, and I would urge that no set dosage be a routine, but that relief of pain be the governing factor in the administration. X ray examination of the whole urinary tract should be carried out at once. Its importance lies more in revealing conditions in other parts of the urinary tract than in the definite localization of the offending calculus in the ureter. One must be very cautious before diagnosing suspicious shadows as calculi, however suggestive they may be, in a plain skiagram. Calcified glands, phleboliths and calculi have usually distinctive appearances, but there will be a

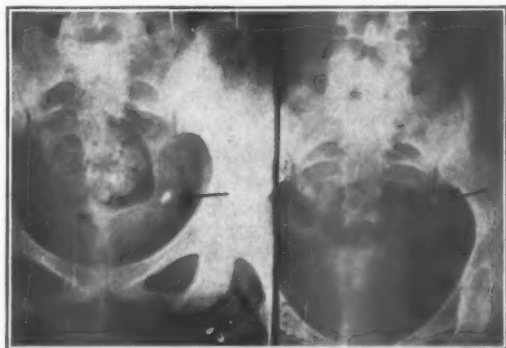


FIGURE VI.

too high percentage of error if one relies on appearance alone. Tuberculosis of the kidney may prove deceptive.

As far as the preparation of patients for radiography is concerned, I have not found enemas of much help in getting rid of the gas which collects in these cases.

Investigation is proceeded with under either caudal or spinal anaesthesia in the male, and usually with local anaesthesia in the female. For caudal anaesthesia I use ten to twelve cubic centimetres of a 3% solution of "Novocain." Low spinal anaesthesia may be induced, but I feel that subsequent steps might be much facilitated when the stone is being dealt with in the ureter if a high spinal anaesthesia is used.

Cystoscopy is carried out in the ordinary way, an indirect instrument being used. The calculus may have passed and be seen lying in the

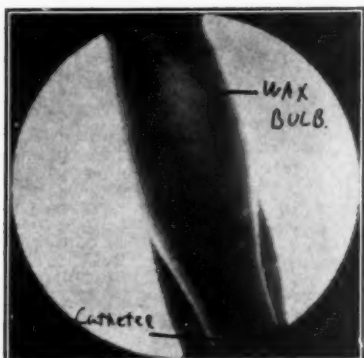


FIGURE VIIA.



FIGURE VIIB.

bladder, or there may be a blood stained efflux from the involved ureteric orifice. Ecchymoses may surround the orifice, due to extravasation of blood into the submucosa of the ureter. There may be nothing passed from the ureter, or there may be excessive activity. A general examination of the remainder of the lower part of the urinary tract should be made. Indigo-carmin 0.4% solution (eight cubic centimetres) is given intravenously just before the cystoscope is introduced. Appearance time and the concentration on the two sides are noted. Marked delay or absence on one side means either diminished function of that kidney or a blocked ureter. If stone is the causal factor, the degree of obstruction of the ureter is important because the damage to the kidney with a completely blocked ureter is very much greater than that caused when urine can escape past the stone. In the one case there is considerable renal damage together with the risk of pyelonephritis, and in the other the discomfort of the patient is probably the worst feature.

The indirect cystoscope finishes, in my hands, its useful application at this stage, and I change over to a direct instrument. I use both the McCarthy Foroblique and the Brasch instruments, and if there is anything that makes ureteric work safe and reasonably easy and pleasing to do, it is the excellent instrument devised by Dr. Brasch, of the Mayo Clinic. With it, if the water regulation is properly carried out, you always have a clear field. There is no Albarran lever and there is no rubber washer to grip the catheter, reduce sense of touch and induce a false sense of resistance, as one is working through a straight large bore tube.

The wax tipped bulb on an X ray catheter is the most definite diagnostic instrument we have when used in conjunction with the Brasch instrument (Figure XI). There is nothing in the cystoscope that can scratch the wax if proper use is made of the instruments, and if a scratch is made in the ureter, stone is the only thing that can cause it. Excluding the ball valve calculus with hydroureter or a calculus lying in a pocket outside the ureter, a scratch can invariably be obtained when a calculus is present. I have had many cases in which no stone was visible on X ray examination, but in which I found the characteristic scratch, and in which I removed a calculus. A case has already been described illustrative of this point. I usually put a small wax tip on the catheter in order to get a scratch here should the catheter fail to pass the stone, and I place a larger wax bulb, usually about nine or ten millimetres in circumference, some ten centimetres from the tip. The size of the bulb and its position vary according to requirements. The scratch caused by a stone is characteristic. It runs longitudinally and, if the bulb is drawn up and down, a series of lines will be seen. A deep groove is often made in the wax bulb by a sharp irregular projection of the stone.



FIGURE VIII.

Figure VIIA shows a bulb before use, and Figure VIIB the same after contact with a stone.

The bulb is passed up the ureter until the catheter is felt to reach the obstruction. It is important in the passage of all ureteric instruments that they be well lubricated with olive oil. This is frequently omitted and results in trauma and a loss of tactile sense as far as the catheter tip is concerned. Gentleness is the one essential. An obstruction may or may not be due to calculus, but the marking on the wax indicates whether or not it is due to the presence of stone. A stereoscopic skiagram with the catheter in position should be taken at this stage. Stereoscopic

skiagrams should be used in all cases or shadows lying behind the line of the ureter will be misinterpreted. Phleboliths usually lie outside, below and behind the line of the ureter.

Figure VIII shows a stone in the left ureter which had given rise to colic. The egg-shaped shadow of the calculus lying in the line of the ureter is fairly distinctive. Note the large catheter used in this case for dilatation. The catheter is stiffened by a stilette, and on it is placed a wax bulb to effect further dilatation.

If the catheter slips past the stone and obstruction has been present, a flow of urine appears which is often coloured with dye. If one catheter does not pass, try other shapes. If three or four catheters are passed, and the principle so well known when dealing with stricture of the urethra

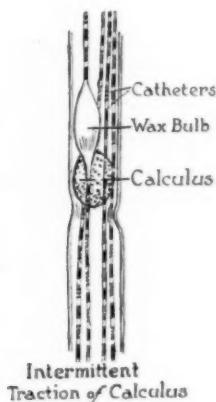


FIGURE IX.

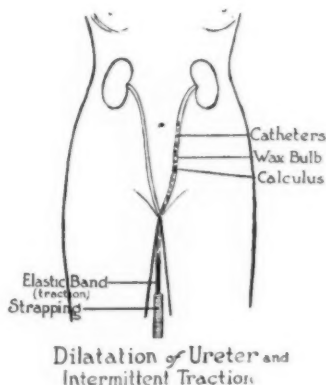


FIGURE X.

is used, one will often slip by the calculus. Pain may be relieved by this manœuvre. Injection of olive oil and a 5% solution of "Novocain" into the ureter both above and below the obstruction makes manipulations easier, and non-irritating antiseptics such as a 1% solution of mercurochrome are possibly of benefit.

If several catheters can be passed, they are left in position, and they surround the stone and form a sledge with which the stone comes down. I have tried the method of rotation with multiple catheters, but have found it rather traumatizing to the ureter. If the wax bulb can be manipulated past the stone, it is followed by several catheters (Figure IX). The bulb, but not the catheters, is now drawn down, and when it reaches the stone, there is the thickness of the bulb together with the additional catheters. The greatest dilatation can be got by this means.

When the stone is gripped by one of these methods, intermittent elastic traction is applied. This is done by fixing a rubber band on to the

catheters on one end, and to the thigh at the other (Figure X). Intermittent traction is gently applied, being used for an hour and discontinued for a similar period. Mercurochrome, olive oil and "Novocain" are injected at intervals. After two or three days bulb and catheter work down into the bladder with or without the stone. If without, the process is repeated with larger bulbs a week or ten days later. This bulb elastic traction method is one I have gradually evolved, and is, I think, both safe and efficient.

If patients with calculi in motion were induced to take large quantities of fluid and made to take vigorous exercise, fewer cystoscopic treatments would be necessary.

Let us now consider the case in which you encounter an obstruction to urine due to stone and find it impossible to pass a bougie beyond the stone. I believe the immediate future of the kidney depends entirely on the presence or absence of infection. Nature, fortunately for the kidney, made it possible for reabsorption to take place when the intrarenal pressure reaches a certain height, and by this means protection is afforded when the ureter is obstructed. This protection lasts some weeks in diminishing degree. If infection is superadded or, as often occurs, is already present, the obstruction *plus* infection will rapidly destroy the kidney, and operative interference is required at the earliest possible moment. I cannot stress too strongly the safety of delay in the one case and the imperative need for operation in the other.



FIGURE XI.

In the non-infected obstructed ureter, should I fail to manipulate a catheter past the stone after two or three attempts, and there is no evidence of its progress downwards, I resort to operation. Other things being equal, one tends to operate earlier if the stone is very large, is impacted high up in the ureter, or if infection of the kidney is present. Delay up to two or three weeks is permissible in the non-infected obstructed ureter, but should not extend beyond this.

As is well known, enormous stones may be passed, and I feel that many patients are operated upon who might be given a further chance to pass the stone. The mechanical effect of a stone in the ureter is of little significance if obstruction does not exist. Meatotomy is a useful procedure if the stone is low or if the ureteric orifices are too tight to permit the passage of large instruments. It offers no technical difficulty with the direct cystoscope.

There are a number of ingenious mechanical contrivances for the dilatation of ureters and for the ensnaring of stones, but I feel we should

keep the risks as low as possible, and I cannot correlate their use with safety for the patient. A distensible rubber bag on the end of the ureteric catheter has been used by some and found safe and effective as a dilating agent.

Anyone operating on an impacted stone will be struck by the rapid development of a stricture below the site of the stone. This is probably spasmodic and congestive at first, but inflammatory products and then scar tissue gradually appear.

Hunner, of Baltimore, has for many years been pointing out the relationship of stricture of the ureter to stone formation and many other pathological conditions of the urinary tract. His views have not as yet been fully accepted. My personal experience is that calculus formation in the kidney is frequently associated with stricture low in the ureter; that many patients with a stricture have gritty *débris* above the site of stricture which comes away after dilatation; and finally that the strictured condition of the ureters is usually bilateral. Most calculi in the ureter descend from the kidney, but some are undoubtedly formed in the ureter above a stricture. In either case stasis due to stricture is an important factor.

The work on urinary colloids and their relationship to absorption and suspension of urinary salts throws an interesting light on calculus formation. The passage of urinary salts in what we consider to be solution is entirely dependent on adequate action on the part of these colloids. Infection in other parts of the body and infection in the kidney play a very important part both as the initial cause and also in the recurrence of stone. My feeling is that, given faulty drainage due to stricture or other causes, any one of these factors turns the tide and lets the rocks appear. Vitamin deficiency appears to have definite bearing on some cases.

Some of these points are illustrated in the following notes.

A man had had eight years of increased frequency of micturition and two months of severe pain in the left loin, radiating into the groin and left testicle. At times scalding and frequency had been intense. On examination, he was a healthy looking man. The lower pole of the left kidney was palpable and tender. The urine was normal. Temperature and pulse were normal. The blood urea was 28 milligrammes per 100 cubic centimetres. Phenolsulphonephthalein on intravenous injection appeared in eight minutes; 35% appeared in the first half hour and 10% in the second half hour; the best figure for urea concentration was 2%. X ray examination showed a shadow which was probably a calculus in the lower end of the left ureter. Cystoscopy revealed a normal bladder. I was unable to pass a catheter up either ureter owing to an obstruction two centimetres from the meatus. After much manipulation a filiform bougie with a small wax bulb was passed on the left side, and was followed by others, and a large Garceau catheter was left *in situ*. The stone passed five days later and was removed from the bladder. A pyelogram of the left kidney showed no dilatation of the ureter or pelvis of the left kidney. Attempts to pass a bougie up the right side again failed, but two weeks later a number 5 French catheter was passed and tied in. Dilatation was carried out to number 11 French catheter on the right side. All symptoms of scalding and frequency disappeared.

This case is typical of ureteric stricture in its relationship to calculus. The long history, stone formation on one side with stricture on both, normal urinary findings and the importance of bulb diagnosis as opposed to pyelographic methods, are the more striking features in this group of cases.

Findings of this nature made me feel that routine dilatation should be carried out after operative or endoscopic removal of stone. Usually only one or two dilatations are required, but a further examination should be made in three to six months. In all cases of calculus, infection in the urinary tract should be cleared up. It is equally important to clear up infection elsewhere.

The problems encountered in bilateral involvement are too big to be considered in much detail here, but I would remind readers that if one side of the urinary tract is pathological, the other half is more likely to show some pathological change than is the kidney of a normal person.



FIGURE XII.



FIGURE XIII.

Figure XII shows a large calculus in the pelvis of the left kidney, and on the right side there is a pyelogram showing marked dilatation of the ureter and pelvis. Another skiagram from the same patient (Figure XIII) shows a calculus on the right side which lies in the upper calyx with the constricted neck. The patient gave a history of inflammation of the kidneys at the age of fourteen years, and passed a stone associated with right renal colic at this time. Five years ago he had a stone removed from his bladder. On examination, phenolsulphone-phthalein appeared in ten minutes after intravenous injection, showing 10% in the first half hour, and 12.5% in the second half hour. Indigo-carmin appeared only in faint traces from each ureter (after intravenous injection) in seventeen minutes. The right ureteric meatus was stenosed and meatotomy was performed and dilatation carried out. Both ureters were dilated with difficulty in a series of sittings and the stone then removed from the left kidney. Indigo-carmin was ejected in high concentration from each ureter in ten minutes after intravenous injection.

This case is a more advanced one than that previously quoted, but I believe the underlying pathology is the same. Obstruction and super-added infection have led to changes certainly more gross, but of degree and not of kind. Examination and treatment in childhood might have saved this patient much renal damage.



FIGURE XIV.



FIGURE XV.

Figure XIV is from a somewhat similar case. On the left side is a large branched calculus, and on the right side a pyelogram. During the past twelve years the patient has passed thirty stones from the right kidney, and inspection



FIGURE XVI.



FIGURE XVII.

of the pyelogram shows where the stones are forming. He has had intermittent bladder symptoms during the past seventeen years. His urine was turbid and a mixed infection was present. Indigo-carmin (intravenous injection) appeared from the right side in seven and a half minutes, and from the left side in fifteen minutes. There was no obstruction on either side. Infection appears to

be the main factor in calculus formation in this case. It is of interest to note that the stone factory in the right kidney is in the dilated, poorly drained calyx. The calculus in the left kidney was removed. With renal lavage and dilatation of the ureters there has been no stone formation since the operation eighteen months ago, and the urine is now clear.

Figure XV shows a large branched phosphatic calculus in the left kidney. The patient complained of hæmaturia and left sided pain. He had never had symptoms on the right side. Renal function on the left side was poor, and on the right side only traces of dye appeared. Figure XVI shows the condition of affairs on the right side. Repeated attempts to pass instruments up the right ureter were unsuccessful, a block being found about five centimetres from the meatus. A ureterogram shows the dilated lower end of the ureter below the obstruction. Stricture of the right ureter with a functionless kidney was diagnosed, and the calculi were removed from the left kidney. At the operation the right ureter was



FIGURE XIX.



FIGURE XVIII.

exposed and found to be dilated to 18 millimetres (three-quarters of an inch) in diameter. The right kidney was atrophic. This was one of my early cases, and the left ureter was not investigated for stricture. I have not been able to trace this patient.

Figure XVII is from a patient with bilateral infection of the kidneys. In each pelvis is a calculus, and investigation shows that the left kidney is practically functionless, being a very large hydronephrotic sac. These stones have both formed in the past two years, and no treatment has been undertaken, as the patient refuses it. His right kidney is undergoing progressive damage, and he is in danger of calculus anuria. Surgical operation in this class of case is urgently demanded.¹

Figure XVIII illustrates bilateral stone formation. On the left side a large triangular stone fills the pelvis, and on the right side there are multiple small stones. Both kidneys are infected and both show diminished function. No stricture is present on either side. The left calculus was removed, and the right side treated with pelvic lavage and dilatation of the ureter. Fragments passed from the right side after dilatation.

¹Emergency operation was performed (since this paper was written) for calculus anuria due to impaction of calculus in the upper part of the ureter.

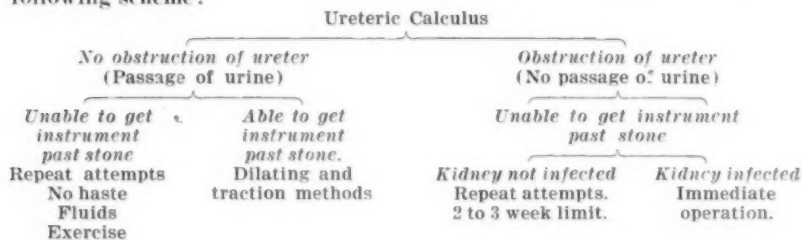
Conservative treatment is essential in bilateral conditions unless one kidney is beyond all hope of recovery. There is little hope of recovery in a damaged kidney if its fellow has undergone compensatory hypertrophy. On the other hand, a grossly damaged kidney will carry out the needs of the body if the other kidney has been removed.

Figure XIX is a skiagram showing a large calculus giving a perfect cast of the renal pelvis and calyces on the right side, and a stone in the upper end of the ureter on the left side. This patient presented himself with a history of having passed about ten stones from the left side during the last twelve years. He had never had any symptoms on the right side. He was in severe pain when first seen and practically anuric. His temperature was raised and he was toxic and vomiting.

Indigo-carmin (intravenous injection) showed a trace from the right side in twelve minutes. None came from the left. There was an obstruction twenty-seven centimetres up the left ureter, and I was unable to pass it or to push the stone back into the renal pelvis. He was operated upon at once, and from a hypertrophied, tense, œdematous kidney a calculus was removed by pyelotomy after the stone had been pushed up into the pelvis. The right kidney has not yet been dealt with.

SUMMARY.

The treatment of ureteric calculus may be summarized by the following scheme:



LATE RESULTS AFTER UNILATERAL URETERO- INTESTINAL ANASTOMOSIS: AN EXPERIMENTAL STUDY WITH REFERENCE TO THE ALLEGED RENAL DISUSE ATROPHY.

By ADOLPH BOLLIGER AND P. N. WALKER-TAYLOR.

[From the Research Laboratory, Department of Urology, Royal Prince
Alfred Hospital, Sydney.]

IN the course of experimental work carried out in this laboratory on the subject of uretero-intestinal anastomosis, five dogs with successful unilateral implantations were kept alive for periods of more than 280 days. Three of these animals were subjected to left uretero-colostomy and the remaining two to right uretero-duodenostomy, while a sixth animal, subjected to bilateral uretero-colostomy, survived for a similar period and is mentioned for purposes of comparison. The object of this paper is the discussion of the late results after experimental unilateral uretero-intestinal implantation.

PREVIOUS WORK.

Except for the work of McKenna,⁽¹⁾ who reported upon three dogs with apparently permanently successful unilateral uretero-colostomy, little attention has been paid up to the present to the question of the ultimate fate of a kidney whose ureter is implanted into the large bowel, while the opposite kidney is still discharging urine into the bladder. Furthermore, the permanent compatibility with normal life of unilateral uretero-colostomy in the absence of an opposite kidney has not yet been proved, and, in fact, quite recently the possibility of obtaining a permanently functioning uretero-colostomy in the dog has been doubted.⁽²⁾

No reference to uretero-duodenostomy is found in the literature prior to 1914, when Sweet and Stewart,⁽³⁾ while studying the path of ascending renal infection, performed unilateral uretero-duodenostomy on a series of seven dogs. They severed the ureter close to the bladder and passed the free upper end through the lumen of the greater pancreatic duct into the duodenum. In none of these seven cases was evidence found of renal infection. In some instances there was distinct evidence of obstruction, and in all of them death resulted about eight to twelve days after removal of the non-implanted kidney. In their report they make no mention of either hypertrophy or atrophy of the

kidney concerned, nor of the period for which the animals were kept alive after uretero-duodenostomy.

Baird, Scott and Spencer⁽⁴⁾ three years later followed a similar surgical technique in performing right-sided uretero-duodenostomy on five dogs. The animals were killed from seven to ten weeks later. In no instance was there any sign of infection in the kidney and functional tests revealed in every case equal efficiency in right and left kidneys. In other animals, after removal of the opposite kidney four to six weeks after uretero-duodenostomy, the animals died in from seven to twelve days.

Goto,⁽⁵⁾ in 1918, carried out metabolic studies on two dogs operated upon according to the technique of Sweet and Stewart. He found that, after the transplantation of one ureter into the duodenum, there was generally a moderately increased output of nitrogen in the urine and a moderate nitrogen-retention in the blood. He explained the death which follows opposite nephrectomy by the theory of suspended renal activity in the kidney whose ureter was implanted. This theory was denied and disproved by Hinman and Belt.⁽⁶⁾ In none of the articles of Baird, Scott and Spencer or of Goto is found any reference to hypertrophy or atrophy in the kidney whose ureter had been transplanted.

In 1922 Hinman and Belt reported their observations on the same subject.⁽⁶⁾ In contrast to previous workers, they employed the Fowler-Coffey technique. They presented fourteen experiments of this nature. Six of these experiments exemplified "intestinal absorption"; in three recovery took place after ureterostomy of the implanted ureter, when opposite nephrectomy had been performed and death was imminent; two were presented in which bilateral renal hypertrophy took place; and in three late atrophy occurred of the kidney whose ureter was implanted into the duodenum. Hinman, in developing his theme of renal counter-balance, referred to these same experiments on two subsequent occasions,⁽⁷⁾⁽⁸⁾ and, further, presented an additional experiment showing the occurrence of late atrophy. In explaining the occurrence of late atrophy in these four experiments, Hinman postulated the theory of renal disuse atrophy.

So far as we have been able to determine between 1926 and the present time, no further work has been published on this subject, and we were rather surprised to obtain results in two cases of uretero-duodenostomy which are to all intents and purposes identical with those obtained in cases of implantation into the colon, and which do not bear out the observations of Hinman and his coworkers in regard to late renal atrophy.

TECHNICAL PROCEDURES.

The operative procedure has already been described by one of us.⁽⁹⁾ The so-called open tunnel technique has been employed in the two cases of uretero-duodenostomy (Experiments 1 and 2), as well as in two

experiments of uretero-colostomy (Experiments 3 and 4). In Experiments 5 and 6 the so-called closed tunnel technique was employed.

Throughout these experiments frequent estimations were made of the urea content of the blood and of the urine from the rectum of these animals by means of the urease method. The functional activity of the implanted kidney in the last three experiments was further estimated by dye tests, the dyes used being indigo-carmin and phenolsulphonaphthalein. Urine from the rectum was obtained by inserting a rubber catheter through the anus. The urinary tract was made visible with

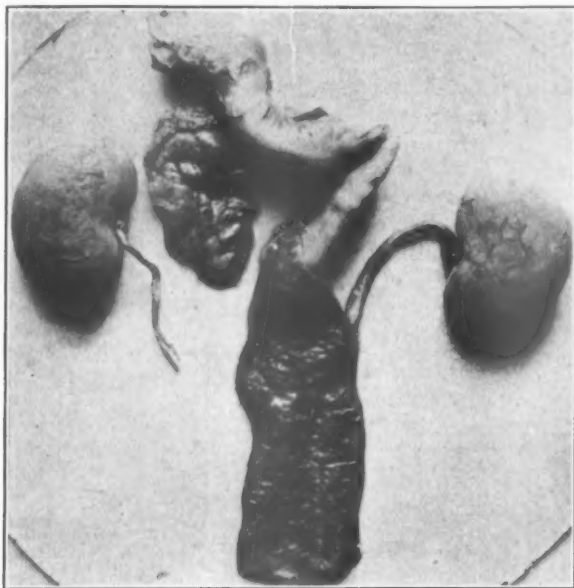


FIGURE 1. Experiment 1. Unilateral right uretero-duodenostomy of nine and a half months' standing.

varying success by radiography following intravenous injections of "Uroselectan", 2.0 to 3.0 grammes of the contrast medium per kilogram body weight being used.

EXPERIMENTAL FINDINGS.

Experiment 1: Right Uretero-Duodenostomy. The dog used in the first experiment was a black long-haired bitch weighing 9.8 kilograms. The blood urea before operation was 39 milligrammes per 100 cubic centimetres. On September 3, 1930, the right ureter was implanted into the duodenum. The health and activity of the dog were not affected by the operation. The rectum of the dog was frequently examined with the insertion of a rectal tube for the presence of fluid, but none was found at any examination except after the administration of large

intravenous doses of urea. Twenty-six days later laparotomy was performed. No adhesions were found, and the implantation looked satisfactory. The right ureter ran from the kidney to the duodenum without any kinking. Compared with the urinary tract on the left side, the right kidney and its ureter were of normal size and appearance. It was determined to pass a dilating instrument along the implanted ureter so that any obstruction which might possibly be present should not be overlooked. The ureter was opened six millimetres (one-quarter of an inch) proximal to the tunnel. A small perforating instrument was passed down the ureter and into the duodenal lumen without difficulty. The small longitudinal incision in the ureter was resutured and the abdomen closed.

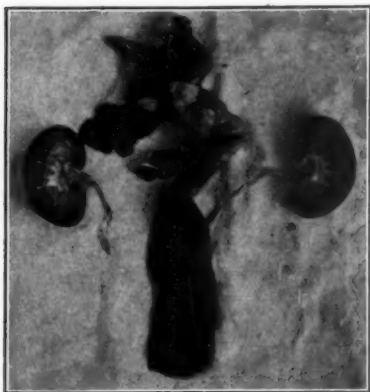


FIGURE II. Experiment 1. Same specimen as Figure I, with kidneys sectioned.

The general condition of the dog remained consistently good following this operation. At frequent examinations nothing but hard faeces was found in the rectum.

Four months later, the animal still being in splendid condition, laparotomy was again performed. The implantation was again found to be anatomically correct, and the kidney was of normal appearance and the same size as its fellow.

Since the last operation until the date of its death, the rectal content of this animal was investigated on frequent occasions, but no fluid was found to be present if no urea had been given. Four months after the last operation the animal was seen to have developed a severe dermatitis (which was at that time almost universal in the animal yard). This condition became worse, and the animal lost

weight progressively until it died a fortnight later, nine and a half months after the initial operation.

Frequent blood urea estimations were made on this animal, which are set down in Table I. At autopsy one slight filmy adhesion was found at the abdominal wound and one small adhesion between the ureter and near the implantation site. The implantation was anatomically perfect. On opening the duodenum a

TABLE I.—SHOWING FINDINGS IN EXPERIMENT 1.

Date.	Blood Urea in Milligrammes per centum.	Remarks.
September 3, 1930	37	Right uretero-duodenostomy.
September 4, 1930	36	
September 8, 1930	44	
September 11, 1930	46	
September 16, 1930	39	
September 29, 1930		First biopsy.
September 30, 1930	39	
October 1, 1930	51	
October 10, 1930	43	
November 5, 1930	60	
November 21, 1930	72	Second biopsy.
January 29, 1931	63	
February 2, 1931	36	
April 7, 1931	49	Post mortem examination.
June 15, 1931	95	

probe demonstrated that the right ureter was patent throughout. A drop of clear urine was milked from the ureter. A very small papilla was present on the duodenal aspect. Both kidneys were of the same size and appearance. The left kidney weighed 28.2 grammes. The right kidney weighed 27.9 grammes.

Microscopical examination of the left kidney showed considerable toxic spilling and vacuolation in the tubules. There was no other departure from normal. No evidence was found of infection or chronic change.

Microscopical examination of the right kidney showed a precisely similar appearance. The tubules and glomeruli were of the same uniform size throughout, and were, furthermore, of the same size as those of the left kidney. There was no renal atrophy, neither was there any evidence of infection or fibrosis (see Figures I, II and III).

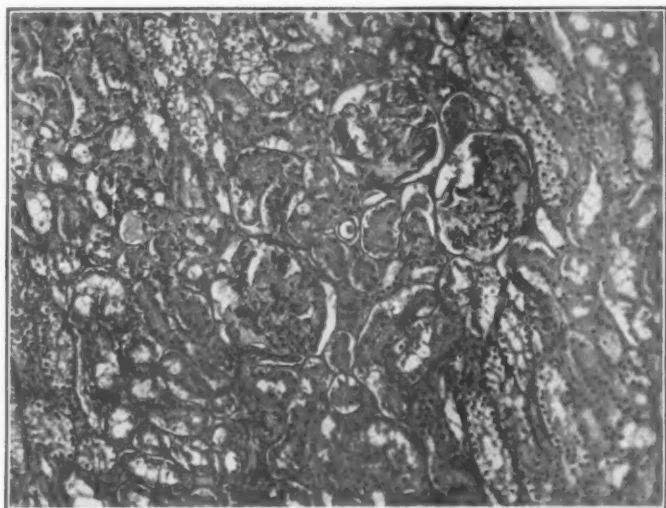


FIGURE III. Experiment 1. Section from the right kidneys of which the ureter was implanted into the duodenum. The acute degenerative changes are due to a fatal dermatitis and are the same in the kidney the ureter of which was not implanted into the bowel.

Experiment 2: Right Uretero-Duodenostomy. The animal used in the second experiment was a male fox terrier, weighing ten kilograms. The blood urea before operation on September 1, 1930, was 40 milligrammes per 100 cubic centimetres. The dog made a good recovery and continued in excellent health, and fourteen days later laparotomy was performed. Both kidneys and ureters were found to be similar in size and appearance. The right ureter was opened near the site of implantation and its patency assured by passing down a suitable dilating instrument. Four and a half months later laparotomy was again performed. The right kidney and ureter were seen to be macroscopically normal and similar in size and appearance to the left. The implantation was satisfactory. The animal subsequently remained in excellent condition. Four months later intravenous pyelography was performed. Twenty grammes of "Uroselectan" dissolved in 40 cubic centimetres of water were injected intravenously. X ray photographs were

taken at five, 15, 30, 60 and 120 minutes after injection. Some of the "Uroselectan", according to the shadows on the plate, was seen to have passed through the right kidney and ureter into the duodenum and small intestine as early as five minutes after injection. This was very plainly seen in the photograph taken sixty minutes after injection, which is reproduced (see Figure IV). Though the kidney

pelvis did not show up in this experiment, it was evident that the right kidney was functioning well. Three months later the animal was anaesthetized with "Avertin". Complete relaxation was obtained. The kidneys were plainly felt and no disparity in size or consistency was evident. Shortly after this examination the dog absconded and could not be found again.



FIGURE IV. Experiment 2. Intravenous pyelography eight months after unilateral implantation into the duodenum. The urinary tract is not visible in this plate, but the coils of the small intestine as well as the bladder are filled with the contrast medium.

In Experiment 2 we present an animal which had lived in excellent health for 380 days after right uretero-duodenostomy. According to actual examination at laparotomy, no anatomical atrophy existed after 158 days, and, furthermore, according to pyelography, no physiological atrophy was present after 244 days.

On palpation under anaesthesia one year after implantation no difference in size or consistency of the two kidneys could be detected.

The frequent blood urea estimations made on this animal are set out in Table II. It is to be noted that they are similar to those obtained from Experiment 1.

Experiment 3: Unilateral Uretero-Colostomy. On August 27, 1930, in a large Irish terrier, with a body weight of 15.8 kilograms, implantation of the left ureter into the colon was performed at a level half-way between anus and caecum. Recovery from the operation (closed tunnel technique) was uneventful, and the animal lived for almost one year in apparently good health, when it was noticed that it had a raised blood pressure. It then became emaciated, weak and mangy.

and was killed on August 11, 1931, 349 days after the implantation had been performed. During life the urea content of the urine obtained from the rectum was frequently examined. The findings are listed in Table III, together with simultaneous blood urea estimations.

At autopsy the spleen was found to be the seat of a tumour, almost the size of a walnut, together with a number of smaller tumours. The urinary tract was removed as a whole and is reproduced in Figure V. Macroscopically the unimplanted ureter (right) as well as its kidney was normal in size and appearance. The implanted ureter is slightly thickened in its upper two-thirds. This enlargement is due to a kink in the course of the ureter, due to the fact that the

TABLE II.—SHOWING FINDINGS IN EXPERIMENT 2.

Date.	Blood Urea in Milligrammes per centum.	Remarks.
September 1, 1930	40	Right uretero-duodenostomy.
September 2, 1930	38	
September 8, 1930	60	
September 11, 1930	39	
September 15, 1930	56	
September 16, 1930	47	First biopsy.
September 18, 1930	50	
October 1, 1930	43	
October 10, 1930	63	
November 5, 1930	60	
November 21, 1930	100	
February 5, 1931	33	
February 9, 1931	39	
May 13, 1931	70	
June 2, 1931	64	
July 21, 1931		Second biopsy.
August 16, 1931		

TABLE III.—SHOWING FINDINGS IN EXPERIMENT 3.

Date.	Blood Urea in Milligrammes per centum.	Urea Content of the Rectal Fluid.
August 27, 1930	33	
August 27, 1930 ¹	41	
August 28, 1930	34	
August 29, 1930	39	1.5%
August 30, 1930	41	1.9%
September 2, 1930	43	
September 4, 1930	43	
September 5, 1930	38	
September 11, 1930	44	
September 16, 1930	47	0.6%
October 1, 1930	51	0.9%
October 10, 1930	51	1.4%
November 4, 1930	43	1.8%
November 21, 1930	64	1.8%
November 28, 1930	64	1.4%
January 3, 1931	70	
January 30, 1931	52	1.1%
February 9, 1931	78	1.2%
March 9, 1931	33	
April 7, 1931	109	0.9%
May 11, 1931	90	
May 14, 1931	88	0.7%
May 20, 1931	91	1.2%
May 22, 1931	71	
June 15, 1931	66	
July 22, 1931	117	1.5%
August 10, 1931	210	1.5%
Post mortem		

¹ Left uretero-colostomy performed.

peritoneal covering was not severed at the time of operation for a sufficiently long distance, so that a slight obstruction resulted at the point where the ureter left the posterior abdominal wall (see Figure V). Owing to this the upper part of the ureter as well as the pelvis of the kidney was slightly enlarged.

On microscopical examination the parenchyma of both kidneys was found to be affected by chronic changes of a similar nature, areas of focal fibrosis being

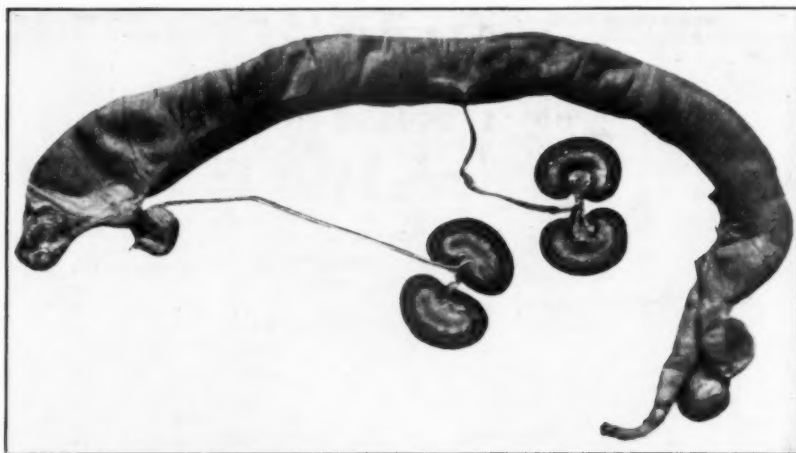


FIGURE V. Experiment 3. High uretero-colostomy of a year's standing. The implantation was technically not completely perfect. A slight stricture due to a kink was formed in the lower third of the implanted ureter.

present, which appeared to be rather larger and more abundant in the kidney the ureter of which was not implanted.

TABLE IV.—SHOWING FINDINGS IN EXPERIMENT 4.

Date.	Blood Urea in Milligrammes per centum.	Urea Content of the Rectal Fluid.
August 18, 1930 ¹		
August 19, 1930	32	
August 25, 1930	78	
August 30, 1930	58	
September 1, 1930	43	
September 23, 1930	35	
October 10, 1930	41	
November 6, 1930	37	1.3%
December 16, 1930	39	1.6%
February 9, 1931	85	1.5%
August 10, 1931	64	1.3%
August 20, 1931 ²		
August 21, 1931	84	1.3%
August 22, 1931	79	
August 24, 1931	81	1.6%
December 23, 1931	53	1.6%
February 10, 1932	87	1.7%

¹ Operation performed. ² Right nephrectomy performed.

Experiment 4: Unilateral Uretero-Colostomy with Opposite Nephrectomy One Year Later. On August 18, 1930, implantation of the left ureter into the pelvic colon was carried out in a medium sized male fox terrier. The "aseptic irreversible tunnel" technique was employed. Recovery was rapid and uneventful, and five days after operation urine was found to be present in the rectum, after which urine was found in this situation at every examination. The urea content of the urine from the rectum was frequently determined, and the findings, with simultaneous blood urea estimations, are set out in Table IV. For a year the animal was kept under observation, and on August 20, 1931, right nephrectomy was performed. The animal recovered quickly from the operation and remained in perfect health, gaining weight. The rectal urine was found to be much more copious than before nephrectomy, from 200 to 250 cubic centimetres being drained off on several occasions, and its urea content became higher than before operation. As shown in Table IV, the blood urea content also rose to a level about 20 milligrammes higher than it was before operation. The highest blood urea content recorded was 111 milligrammes, thirteen days after nephrectomy. The animal was still in perfect health six months after nephrectomy and eighteen months after ureterocolostomy. Intravenous pyelography sixteen months after implantation indicates a dilated pelvis and ureter (see Figure VI).



FIGURE VI. Experiment 4. Intravenous pyelography sixteen months after unilateral implantation into the colon. The plate was taken three hours after the injection of "Uroselectan".

Experiment 5: Unilateral Uretero-Colostomy Followed by Opposite Nephrectomy. A brown male sheepdog, with a body weight of 12.5 kilograms, was operated on on March 8, 1930. The right ureter was implanted into the rectum by the "open tunnel" method. Sixteen days later left nephrectomy was performed. The dog quickly recovered from the operations, gained weight and up till the present, that is, two years after the implantation, has lived a perfectly healthy life. Frequent blood urea examinations and examinations of the urine urea in the fluid drained from the rectum were done and are listed in Table V. The blood urea fluctuated, mostly between 50 and 70 milligrammes per 100 cubic centimetres of blood, but owing to reabsorption values as high as 116 milligrammes were observed at times. The rectal fluid in most instances showed a urea content of about 2%.

Experiment 6: Bilateral Uretero-Colostomy Followed by Atrophic Changes in One Kidney. A white and black sheepdog, with a body weight of 13 kilograms, was operated on on March 31, 1930. The right ureter was implanted into the rectum by the "open tunnel" method. Nine weeks later the left ureter was implanted

lower in the rectum by the "closed tunnel" method. The animal recovered quickly from the operations and remained in good condition. Blood urea readings are listed in Table VI, with simultaneous determinations of the urea content of the urine found in the rectum. Eleven months after the second operation the animal was killed by the intravenous administration of a large amount of urea. At autopsy both ureters were found to be patent. The left ureter was found to be somewhat thickened and the left kidney was small and fibrotic, particularly at the upper pole. The right kidney appeared hypertrophic, but was normal in consistency. On microscopical examination the right kidney was found to be normal. The left kidney showed evidence of infection and extensive fibrosis, particularly marked at the upper pole, where gross fibrosis could easily be seen (see Figure VII).

TABLE V.—SHOWING FINDINGS IN EXPERIMENT 5.

Date.	Blood Urea in Milligrammes per centum.	Urea Content of the Rectal Fluid.
March 6, 1930	36	
March 8, 1930 ¹		
March 19, 1930	62	
March 20, 1930	55	
March 24, 1930 ²		
March 25, 1930	60	
March 31, 1930	100	
April 4, 1930	85	
April 14, 1930	113	
May 6, 1930	33	
May 16, 1930	86	
May 31, 1930	61	
June 11, 1930	62	
June 21, 1930	54	
July 10, 1930	61	
September 5, 1930	68	2.0%
October 1, 1930	41	1.7%
November 4, 1930	81	2.1%
December 16, 1930	65	2.0%
February 4, 1931	66	2.0%
April 8, 1931	60	2.1%
July 1, 1931	114	
August 25, 1931	96	1.0%
September 16, 1931	52	
October 20, 1931	58	
December 24, 1931	116	2.0%
January 4, 1932	86	2.2%
April 3, 1932	89	1.8%

¹ Implantation of right ureter carried out. ² Nephrectomy performed.

TABLE VI.—SHOWING FINDINGS IN EXPERIMENT 6.

Date.	Blood Urea in Milligrammes per centum.	Urea Content of the Rectal Fluid.
March 31, 1930 ¹	33	
April 22, 1930	67	
May 6, 1930	53	
June 11, 1930 ²	46	
June 21, 1930	37	
June 30, 1930	41	
July 21, 1930	57	
September 5, 1930	71	2.1%
November 4, 1930	57	1.6%
November 25, 1930	56	1.6%
December 16, 1930	95	2.6%
March 13, 1931	80	2.0%
March 27, 1931	105	2.6%

¹ Right uretero-colostomy performed. ² Left uretero-colostomy performed.

DISCUSSION.

The question of the fate of a single kidney concerned in unilateral uretero-intestinal anastomosis is an important one not only from a theoretical but also from a practical point of view.

The theoretical side of the question with reference to uretero-duodenostomy has been mentioned by Hinman and Belt.⁽⁶⁾ They considered that in the case of unilateral uretero-duodenostomy both kidneys hypertrophy for the first two or three months after operation. According to their explanation, this is due to the complete reabsorption of the urine coming from the implanted ureter. This process produces an extra load for both kidneys, which consequently undergo hypertrophy.

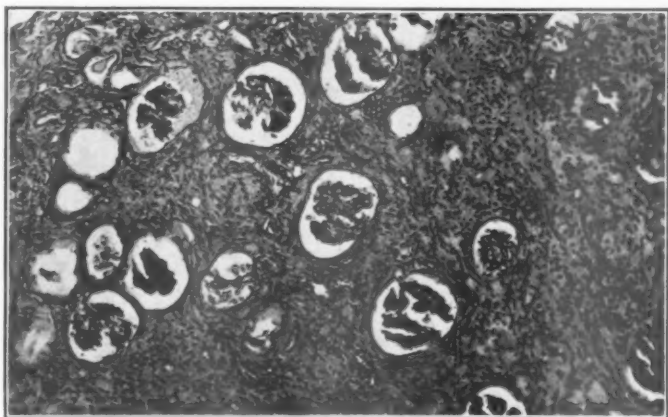


FIGURE VII. Experiment 6. Section from the fibrosed upper pole of the left kidney.

But if the kidney whose ureter has been implanted is examined later on, it will be found to have undergone atrophic changes which vary from considerable to complete atrophy, roughly according to the time elapsed.

They presented two dogs whose kidneys were examined at autopsy fifty-one and eighty-three days respectively after unilateral uretero-duodenostomy. These kidneys were stated to be uninfected and identical in pairs, but hypertrophied. But the assessing of renal hypertrophy in the dog is a somewhat difficult problem. Apart from the actual measurements from time to time of the same kidney, we have no indisputable criteria to act upon.

Our experiments are also not conclusive in regard to this question, since only approximate comparisons were made at repeated biopsies. However, no marked hypertrophy was observed by this method. Our only case of uretero-duodenostomy in which the kidneys were actually weighed (Experiment 1) came to autopsy 283 days after operation. The

weights of the kidneys were 28.2 and 27.9 grammes respectively, and the body weight of the dog was 9.4 kilograms. In this case the body weight-kidney weight ratio does not indicate hypertrophy. However, hypertrophy cannot be definitely excluded, particularly in the light of the recent figures of ratio obtained by Sato⁽¹⁰⁾ on 252 dogs. He showed that the coefficient of variation in the case of the kidneys was 27.7. But since hypertrophy of the kidneys due to increased load, for example increased protein intake, is recognized, it would be only logical to assume a similar process taking place in unilateral uretero-duodenostomy till the contrary has been proven.

As already pointed out, Hinman postulates the occurrence of atrophic changes due to disuse after an initial period of hypertrophy—a fundamental biological principle which so far had not been recognized in regard to the kidney. Just as increased renal activity produces renal hypertrophy, so diminished activity will produce renal atrophy. Of Hinman's four experiments, the two with most atrophy show distinct evidence of infection. The other two show atrophy of lesser degree and Hinman admits that infection may also be present, though less pronounced than in the two others. But neither injury nor infection is considered as a sole factor of this late atrophy, which is supposed to be chiefly due to disuse.

In spite of the fact that the experimental evidence is not quite conclusive, we were quite convinced by the suggestive presentation of Hinman. Therefore we were rather surprised to discover that our experimental findings did not bear out the hypothesis. As is shown in Experiment 1, after 283 days following unilateral duodenostomy no evidence could be found of renal atrophy. This experiment is a complete one. In Experiment 2, which unfortunately could not be completed, after 360 days no evidence of renal atrophy could be detected. Therefore we are satisfied that with uretero-duodenostomy renal atrophy within the periods mentioned by Hinman does not occur, if the implantation is and remains technically perfect.

Renal atrophy due to any functional disturbance in the ureter or due to infection of any kind certainly could not be called disuse atrophy, and because the blood supply of both kidneys is equal, it would be difficult to explain rationally why the kidney whose ureter is implanted into the duodenum should always undergo atrophic changes.

As shown by the previous workers in the field and as confirmed by us under ordinary conditions, all of the urine poured into the duodenum is reabsorbed and the only metabolic disturbance so far demonstrated is a frequently elevated blood urea content (see Tables I and II).

The variations in the fasting blood urea level are considerable, and they are explained tentatively by the variations of the urea content of the urine discharged into the upper intestinal tract as well as by the variations in the rate of absorption by the intestine. After removal of the opposite kidney a uræmic death ensues.

Urinary reabsorption and consequently urea reabsorption to a certain degree also takes place at least in the dog after any uretero-

intestinal implantation, irrespective of the level of implantation. In another publication in which it will be shown that urea administered rectally is absorbed rapidly by the rectal mucosa, this question will be dealt with more extensively. However, as shown in Experiments 3, 4, 5 and 6, limited but constant reabsorption takes place also in uretero-colostomy. This is shown by the fact that the urea content of the urine obtained from the rectum is below normal and the blood urea content usually somewhat elevated. This was particularly noticeable in Experiment 3, in which the uretero-colostomy was performed at a high level. On the other hand, these low values, particularly in the later part of Experiment 3, may have been partly due to chronic renal insufficiency, as shown at autopsy occurring in both kidneys, and as shown by elevated blood urea value which was found in the last three months of the experiment (see Table III).

Therefore, if the view that renal disuse atrophy follows uretero-duodenostomy is correct, it would be reasonable to assume that the partial absorption of urine after unilateral uretero-colostomy might also lead to renal atrophy. The whole burden of urinary secretion may be assumed to be transferred slowly to the kidney secreting into the bladder. A good many experiments with bilateral uretero-colostomy seem to lend support to such an assumption. In our series (see Experiment 6), as well as in the series of others and also in clinical cases, it could almost invariably be shown that one of the two kidneys implanted manifests a more or less definite tendency to undergo atrophic changes. But we believe that if both implantations had been equally perfect, both kidneys would have remained in the same state of anatomical and functional equality as they were before operation. This is shown in Experiment 3 and conclusively in Experiment 4. Given a good implantation in the large bowel, the kidney whose ureter is implanted, remains functioning at a degree sufficient to maintain life after removal of the opposite kidney. As already mentioned, Experiment 3, owing to a pathological process present in both kidneys, is not so conclusive as Experiment 4, but in spite of this interference and in spite of an added complication (slight stricture in the ureter), the kidney whose ureter was implanted competed successfully for a period of almost a year with the other kidney with normal urinary drainage.

In our opinion, the renal atrophy observed by Hinman in unilateral uretero-duodenostomy is primarily due to infection. Then on account of the phenomenon of renal counterbalance, atrophic changes take place after the active stage of infection, functional recovery being no "vital necessity" due to the presence of a normal kidney. According to the same principle may be explained the unilateral renal atrophy in bilateral implantation of the ureters into the colon. The microscopical picture obtained from these atrophic kidneys resembles the pictures published by Hinman after unilateral uretero-duodenostomy.

Furthermore, Experiment 4 gives the physiological proof that a kidney whose ureter is implanted into the colon, may remain for an indefinite period in a condition which will enable it to carry on the

necessary secretory function to maintain normal life whenever the opposite kidney is removed. This may be of practical bearing inasmuch as a trial implantation of one ureter could be performed and its functional abilities could be observed for considerable time before any further steps were taken.

We thought it well worth while to put on record the particularly long survival period in Experiment 5. This animal, living only on one kidney whose ureter was implanted into the rectum, has survived so far in excellent condition for over two years. This is particularly interesting in view of the findings of Sisk, Weir and O'Brien, who questioned the possibility of a successful implantation of the ureters into the intestines of the dog. In none of their experiments composed of thirty-one operations was a satisfactory result obtained.

From the point of view of metabolism we should like to call attention to the chronically raised blood urea level as shown in these experiments. As mentioned before, this apparently is due to reabsorption of urinary products by the intestines. Further studies on this problem are still in progress.

SUMMARY.

Successful unilateral uretero-duodenostomy or uretero-colostomy is not followed by atrophy in the kidney concerned. In the case of uretero-colostomy the normal opposite kidney may be removed at any date and the kidney whose ureter has been implanted will function normally. One dog with unilateral colostomy and subsequent heterolateral nephrectomy is still alive and well two years after nephrectomy.

The theoretical and practical significance of these findings has been discussed.

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THE DIAGNOSTIC PROCEDURE OF ENCEPHALOGRAPHY, WITH SPECIAL REFERENCE TO TRAUMATIC FOCAL LESIONS OF THE BRAIN.

By R. ANGEL MONEY AND ERIC SUSMAN.

[From the Professorial Units of Medicine and Surgery, University of Sydney.]

WITH modern radiological technique and faultless radiological interpretation, 35% of all intracranial lesions may now be localized by a plain skiagram.⁽¹⁾ But, in 1918, this comparatively satisfactory state of affairs did not exist, and the neurologist received little or no help from a plain skiagram. Dandy^{(2), (3)} was the pioneer who surmounted this obstacle by the introduction of a contrast medium, air, into the cerebro-spinal axis prior to the taking of the picture. Thus began the practice of encephalography.

More precisely, we may define encephalography as the radiological study of the skull and its contents after cerebro-spinal fluid has been withdrawn and replaced by air. But it is now customary to use encephalography to denote the introduction of air by the lumbar or cisternal routes; and this is the sense in which it is used in this communication. If the air is introduced by a trephine opening directly into a lateral ventricle, the procedure is termed ventriculography—simply a particular method of performing encephalography.

From time to time criticisms, pointing out the dangers of these air-replacement operations, have appeared in the medical press. Provided that a rigid, standardized technique be practised, and that a scrupulous regard for the contraindications be observed, we believe that the vast majority of these criticisms have no foundation in fact. Pancoast and Temple Fay⁽⁴⁾ have collected a series of 1,529 cases from seventeen workers. There were twenty deaths, giving a mortality of 1.2%. Many of these fatalities occurred in patients already moribund and, presumably, in the earlier cases of the different series.

Previous writers on encephalography and ventriculography have expressed their preference for or prejudice against one or other of these procedures. We agree with Pendergrass⁽⁵⁾ that this attitude clearly demonstrates a failure to appreciate the basic principles underlying the two operations. Each has its own distinct sphere of usefulness. Briefly, the matter may be stated thus: Ventriculography, by demonstrating changes in size and shape of the ventricles, is applicable to lesions deep in the brain, whereas encephalography is the method of

choice for demonstrating the more superficial cortical abnormalities. It follows, therefore, that encephalography is preferable in the further investigation of suspected superficial lesions, such as traumatic cerebral contusions, senile cortical shrinkage, Little's disease and such-like maladies.

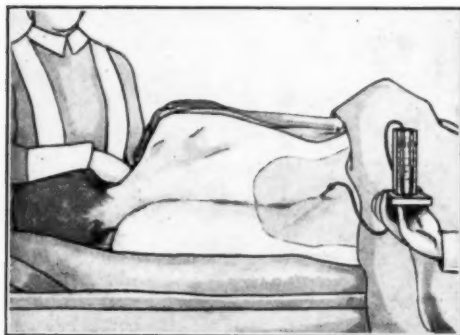


FIGURE I.

thorough physical examination. Listen to the words of the neuro-surgical *maestro*⁽⁶⁾ himself:

But with all said and done, no instrumental aid to diagnosis can equal in importance a detailed and exact history of the symptoms in the chronological order of their appearance. This must ever remain our chief reliance. . . .

CONTRAINDICATIONS.

As an antidote to the misguided enthusiasm at present prevailing in this country, and in order to counteract the airy, light-hearted, almost flippant manner in which these diagnostic operations are undertaken by sundry workers, the paragraphs that follow are necessarily and, indeed, deliberately didactic.

The contraindications may be summarized as follows:

1. It is both superfluous and foolhardy to perform encephalography when an intracranial lesion can be localized by ordinary clinical methods. Dandy⁽⁷⁾ states that 40% of all intracranial lesions can be localized in this way. When these are added to the 35% group already mentioned, it is clear that the procedure is applicable to only some 25% of all cases. In focal diagnosis by

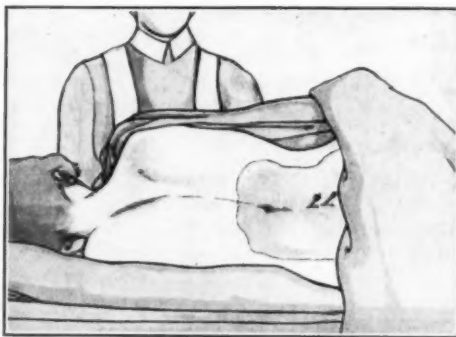


FIGURE II.

purely clinical methods the skill, experience, pertinacity and patience of the individual neurologist will always be a large factor.

2. In suspected infratentorial lesions, the patient should be submitted to air insufflation methods only on the distinct understanding that, if the findings are positive, surgical attack is to be commenced forthwith. The clinician must think in terms of hours, not days, and much less weeks.

3. A lumbar cerebro-spinal fluid pressure of more than twenty millimetres of mercury in the horizontal position—"the arbitrary figure for caution"—is an absolute contraindication in suspected basal lesions. An appreciation of the knowledge of the pathways taken by the cerebro-spinal fluid between its source and its sites of absorption makes it clear that any obstructive lesion in the vicinity of mid-brain and *tentorium cerebelli* cannot but produce hydrocephalus, be it external or internal. These matters have been dealt with somewhat more fully by one of us in a recent communication.⁽⁸⁾ In consequence, the fluid taking its origin within the ventricles cannot escape (internal hydrocephalus); or, having escaped, cannot find its way *via* the sub-arachnoid space, over the vertex (external hydrocephalus). And so, on simple hydrodynamic principles, it is surely obvious that foraminal overcrowding must always be a real danger when the pressure equilibrium is disturbed by the withdrawal of the cerebro-spinal fluid by the lumbar route. Our experience has led us to agree with other workers that a pressure of more than twenty millimetres of mercury in the horizontal position is a sure and certain sign of the existence of a gross and serious form of one or other of the two varieties of the above-mentioned obstructions.

3. It will be convenient at this point to state an important exception to this maximum figure of twenty millimetres of mercury—a figure which does not apply to that group of cases in which the lesion is definitely known to be cortical or subcortical. The problem in these circumstances is one of interference with the cortical fluid pathways, or with absorption at the Pacchionian bodies themselves—the very outlet of the circuit. In these cases, the pressure may reach the high figure of sixty millimetres of mercury. The release of pressure by lumbar puncture, however, is equal within and without the ventricular system,



FIGURE III.

the aqueduct being open, in contradistinction to the release of pressure following lumbar puncture in subtentorial lesions, when it is characteristically and dangerously unequal.

4. The nature of the suspected lesion may in itself be a contra-indication. The pre-operative and pre-neeropsy diagnosis of the pathological architecture of cerebral neoplasms is now much more accurate. This is largely due to the minute and detailed semeiological and pathological studies of Cushing,⁽⁹⁾ and Bailey and Cushing.⁽¹⁰⁾

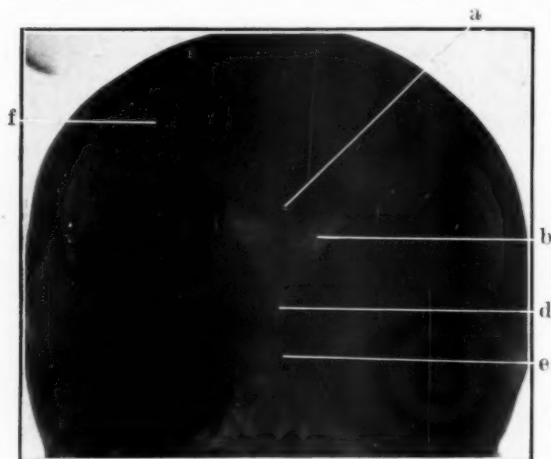


FIGURE IV. Case of minor head injury in man, aged twenty-two years, with slight mental deterioration. Antero-posterior view. Regarded as normal encephalogram. a = subarachnoid air over *corpus callosum*; b = lateral ventricle, at the angle; d = third ventricle; e = fourth ventricle; f = subarachnoid pathways, over surface of cerebrum.

The soft infiltrating gliomata, with the liability to that much dreaded complication of intracorporeal haemorrhage, are notoriously dangerous if any form of diagnostic operative interference whatsoever be undertaken.

TECHNIQUE.

The technique of encephalography described by Pancoast and Fay⁽⁴⁾ cannot really be bettered. Our own methods, with one or two minor modifications to suit local conditions, have been modelled on their

observations. Briefly, the rules for the safe conduct of encephalography are as follows:

1. Perform encephalography in the early morning, when the patient is fasting and after a good night's rest.
2. Give a sedative orally one hour before the operation. We prescribe chloral hydrate, 1.3 grammes. Hypodermic medication is contraindicated.
3. Perform spinal puncture in the fourth lumbar interspace with the patient in the left lateral position.
4. Attach a mercury manometer to the needle and carefully make a pressure reading (see Figure I). The normal pressure in the prone position is six to eight millimetres of mercury. Any reading between eight and eighteen is an indication to draw off cerebro-spinal fluid until the pressure is under ten before proceeding further.
5. If the pressure reading is less than twenty millimetres of mercury, disconnect the manometer and reintroduce the stylet.
6. Introduce a second needle into the spinal theca in the third lumbar interspace (see Figure II).

7. Instruct the patient to remain perfectly rigid. We say: "Imagine yourself to be a marble statue for a moment". Raise him from the prone to the sitting position, the legs finally hanging over the edge of the table. This step requires great care in order to prevent the dislocation of the points of the two needles within the spinal theca. The patient's head is in a position of flexion, and supported by a nurse.

8. Connect the manometer to the upper needle, where it remains *in situ* during the rest of the procedure. The normal reading in the sitting posture is eighteen to twenty millimetres of mercury.

9. Remove the stylet from the lower needle and allow cerebro-spinal fluid to run off freely into a measure glass until the pressure reading is eight or ten millimetres of mercury.

10. Then fill a ten cubic centimetre syringe with air sucked through a piece of sterile gauze. Inject air slowly and gradually through the lower needle until the pressure again reaches twenty millimetres of mercury (see Figure III). The patient now complains of severe frontal headache; disregard this, and reassure him with a few soothing words.

11. When the "safety margin" of twenty millimetres of mercury has been reached, disconnect the syringe and permit the cerebro-spinal fluid to drain until the pressure has fallen to ten millimetres of mercury, and so on. Work slowly and deliberately. In addition to observing this "safety margin" of a maximum pressure of twenty millimetres, keep the amount of air introduced below the amount of cerebro-spinal fluid drawn off.

12. After fifty to sixty cubic centimetres of air have been introduced, have an assistant gently flex and extend the head, with intervening gyrations, as close to the shoulders as possible without moving the spinal axis. Finish up each of these manœuvres with the head at rest in the mid-line in a position of slight flexion. This is the optimum position for the production of a free flow of fluid. These manipulations are necessary in order to empty the ventricles and insure an even distribution of air. These head movements increase the headache, and produce nausea and sometimes vomiting, symptoms which, although alarming in appearance, are of no consequence. On no account is it permissible to suck out fluid with a syringe.

13. When 120 cubic centimetres of fluid have been withdrawn, and at least 100 cubic centimetres of air introduced, withdraw the needles. Before doing so, however, allow the fluid to flow off until the final reading is about ten millimetres of mercury. This allows for the expansion of the air by the body heat. It is

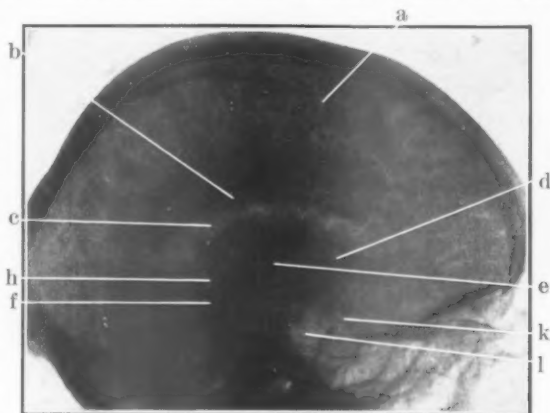


FIGURE V. Same patient as in Figure IV. Lateral view. Regarded as normal encephalogram, except for slight increase in the size of the subarachnoid pathways over the fronto-parietal cortex. a = cortical subarachnoid pathway; b = air over corpus callosum; c = lateral ventricle; d = foramen of Munro; e = third ventricle (faintly outlined); f = aqueduct of Sylvius; h = cisterna intercommunicans, along the course of the fourth cranial nerve; k = cisterna chiasmatis et interpeduncularis; l = cisterna pontis.

unlikely that a satisfactory picture will be obtained with anything less than 100 cubic centimetres of air.

14. Lift the patient from the table on to a stool, his head being continuously maintained in the erect posture. Any deviation from this position, either inclining or recumbent, will result in a displacement of the air, and consequently a distorted picture. The principle of the bubble within the mason's spirit-level must be adhered to. Place the X ray apparatus in a vertical position and move the stool and patient into position in front of the Potter-Bucky diaphragm. Make the true antero-posterior exposure. This outlines the posterior horns of the lateral ventricles, the occipital and subtentorial regions.

15. Then rotate the patient and stool 90°, and make the left lateral exposure (that is, with the left lateral ventricle next the film).

16. Then turn through 180°, and make the right lateral exposure. In these two postures the patient must "hug" the table and keep the innermost shoulder out of the way in order to get the ear and side of the head flat against the diaphragm.

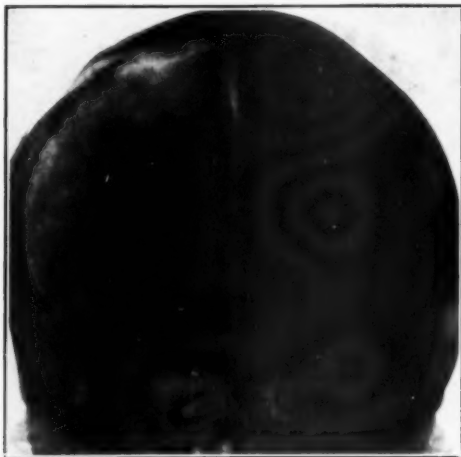


FIGURE VI. Case I. Antero-posterior view showing cranial vault deficiency in right parieto-occipital region. Note the large collection of air indicative of cortical shrinkage, divided into two compartments by adhesions between cortex and *dura mater*. Non-filling of ventricles due to faulty technique.

17. Finally, turn the patient to face the table and make the true postero-anterior exposure with the forehead and nose flat against the diaphragm. This shows up the anterior horns of the ventricles and the frontal region.

18. If it is particularly desired to demonstrate the entire ventricular system, especially the descending horns, Pendergrass⁽¹⁾ recommends that the patient be placed in the lateral horizontal position, with the film above the head and the tube below the table, thus draining the upper ventricle of fluid and filling it with air, which is projected on to the film.

19. Place the patient on a wheeled trolley in a propped-up position; but detain him in the X ray room until the films have been developed and checked, lest any of the exposures need repeating.

20. If the pictures are satisfactory, return the patient to bed, taking care to avoid any violent or sudden head movements, and administer morphine hydrochloride, 16 milligrammes, hypodermically, if necessary. In our experience, all unpleasant symptoms cease within twelve hours.

COMPLICATIONS.

Provided that due regard to the indications for the performance of the operation has been observed, and that the steps of the actual procedure have been faithfully carried out, there are no complications. None has been met with in our practice. Persistence of the headache,

slowing of the pulse and disturbances of respiration have occasionally been recorded. Such complications call for a subsequent spinal puncture, in order to release spinal fluid and air, the patient being in the prone or genu-pectoral position.⁽⁴⁾

THE TAKING OF THE PICTURE.

We advocate a rigid adherence to the following guiding rules:

1. The technique must be absolutely standardized both by the neurologist or neuro-surgeon, and the radiologist. The same routine must be carried out with every case to the minutest detail, if reliance is to be placed on the interpretations.

2. A vertically placed flat Potter-Bucky diaphragm is essential. The apparatus described by Pendergrass⁽¹²⁾ is the ideal one, but was not available for this series, and the ordinary Engeln tilting table with incorporated Potter-Bucky diaphragm (at the Saint Luke's Hospital, Sydney) was used for Cases I, II and III. (The "Keleket" angulating counterbalanced headstand, belonging to the Surgical Professorial Unit at the Royal Prince Alfred Hospital, Sydney, was used for Case IV.) This arrangement allows the patient's head to remain upright and the air at its highest level during the entire procedure. The air in the subarachnoid spaces being photographed is thus next to the film and perfect definition can be obtained. To demonstrate surface lesions, exposures made with the patient lying down are worthless. In the words of Pendergrass: "Roentgenograms made in the horizontal position are not encephalograms." For this reason much of the work that has already appeared in the Australian literature is vitiated.

3. Non-filled or partially filled ventricles and cisternæ are fruitful sources of diagnostic errors. They are usually due to inadequate manipulation of the head during the injection of the air. We have already pointed out the means whereby this breakdown in technique can be avoided. It occurs in inverse proportion to the experience of the operator.

4. Four exposures must be made, namely, antero-posterior and postero-anterior, with the central rays in the sagittal plane; and right and left laterals, with the central rays in the coronal plane. The slightest rotation or deviation may render the entire procedure valueless. During the antero-posterior exposure the head must be tilted forward in order to clear the frontal sinuses.

5. American workers recommend that stereoscopic exposures be made, with up and down shift of five inches for antero-posterior and postero-anterior views, and side to side shift for the lateral pictures. This is desirable, but not essential.

6. The picture should be taken immediately after the full amount of air has been injected. A delay of even one hour will result in a worthless picture, since the air is rapidly absorbed, and the fluid re-collects (*vide* Figure XVIII).

7. To minimize distortion a fine focus tube and its stand must be moved back until a tube-target-film distance of forty-two inches is obtained. With the "Keleket" apparatus the tube-target-film distance is thirty inches.

8. Each sagittal exposure was made at 65 kilovolts with 30 milliampères for six seconds (180 milliampère-seconds), a three kilowatt Müller tube being used. Each lateral exposure was made with the same kilovoltage and milliampère for four seconds (120 milliampère-seconds). Double intensifying screen cassettes were used. With the "Keleket" apparatus, the exposures were made at 75 kilovolts with 40 milliampères for two seconds, a fine focus "Metalix" tube being used.

9. The head must be tightly bound to the table with a compression binder or fixed with special attachments to insure absolute immobilization.

In concluding these technical details, and even at the risk of appearing tedious, we would repeat the following injunctions:

1. During the injection of air let the slogan be "pressure for pressure, not volume for volume".

2. Maintain the upright posture, and carry out the head movements in spite of the discomfort felt and the protests voiced by the patient.

3. Make the exposures at once. A delay of even one hour renders the pictures useless.

4. A vertical Potter-Bucky diaphragm, to obtain perfect definition, is essential.

TRAUMATIC FOCAL LESIONS.

As time goes on, the diagnosis of idiopathic epilepsy becomes rarer and rarer. From the third decade onwards such a diagnosis is scarcely tenable, and in the course of time can usually be proved to be erroneous. It is well known that convulsions are frequently the first indication of the presence of cerebral syphilis and are responsible for a large number of mistakes. Intracranial neoplasm and cerebral abscess may also first manifest themselves by convulsive seizures. But at present

we are concerned with the symptoms which follow on minor head injury, one of which is a fit. Wilfred Trotter,⁽¹³⁾ in 1924, clarified our notions upon traumatic *pachymeningitis hemorrhagica interna* (the subdural haematoma of the older writers) following on localized cerebral contusion, and postulated a very real organic lesion for this condition. He laid great stress on the trivial nature of the trauma, which may inaugurate the sequence of morbid

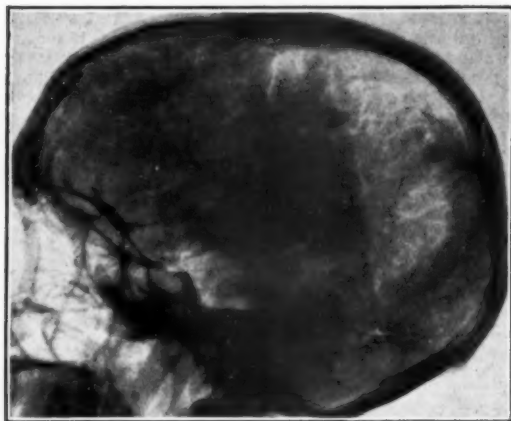


FIGURE VII. Case I. Right lateral view. Note increased transparency posteriorly, due to deficiency in the skull. Gross enlargement of cortical pathways over parietal and occipital lobes. The increased amount of air in the cisternae interpeduncularis et chiasmatis is compensatory.

events. Indeed, it is often difficult to elicit any history of head injury, and this in spite of the fact that lay people regard head injury as a definite and important aetiological factor in many diverse maladies, associated, as it is, in their minds with fearful, dangerous and persistent disability. The symptoms consist of persistent headaches, troublesome giddiness, loss of memory, unprovoked outbursts of temper, changes in disposition, and mild but definite evidence of mental deterioration. So far, this will easily be recognized as the "traumatic neurasthenia", so frequently met with in the practice of the inorganic neurologists, insurance doctors and orthopaedic specialists. But after a latent period the organic nature of the complaint is established beyond all question by the occurrence of a fit. This latent period is very variable. Foerster and

Penfield⁽¹⁴⁾ found it to be anything from five months to fourteen years, with an average in their cases of five and a half years.

The important and underlying pathological process is a progressive cicatricial contraction of the brain at the site of injury, accompanied by vascular overgrowth. In time, this may become an epileptogenous area and, according to Penfield,⁽¹⁵⁾ the only hope of permanent cure is a wide radical excision of the abnormal area. In such a lesion there is a progressive diminution of the neuroblastic elements with a concomitant increase of glial and mesoblastic response (the vaso-astral framework of Penfield). It is a useless reactionary mass and must, for therapeutic purposes, be regarded as a highly obnoxious foreign body. Such lesions may occur anywhere on the cortex; they yield characteristic auræ, followed in many cases by diagnostic convulsive phenomena.⁽¹⁶⁾

A more intimate understanding of focal head injuries is now essential in medical and surgical practice on account of their increasing frequency — a frequency that has been brought about *inter alia* by the Great War, the development of the internal combustion engine and the consequent popularization of motor transport, the mechanization of industry generally, and the world pandemic of litigation under democratic industrial laws.

Even before the appearance of the auræ or the convulsions, encephalography yields localizing information of supreme importance by showing: (i) Ventricular dislocation, distortion and inequality;⁽¹⁷⁾ (ii) localized overfilling of subarachnoid spaces, brought about by localized shrinkages; (iii) absence of translucency in those situations where it is normally present, due to closure of the usually patent fluid pathways; (iv) alteration in size and shape of the arachnoidal cisternæ.

Where malingering is suspected, encephalography should always be performed, because the findings are often decisive. Normal encephalographic findings are profoundly significant, and strongly confirm the



FIGURE VIII. Case I. Plain right lateral view showing large deficiency in cranial vault and ununited bone flap prior to bone grafting. The small foreign bodies are silver clips used for hæmostasis.

suspicion of feigned disease, a point that has been well made by Swift.⁽¹⁸⁾ In this connexion, it is as well to emphasize the inadequate report of the radiologists on a plain skiagram, to wit, "no fracture detected". It is a knowledge of the contents, not the container, that the clinician requires. It should also be noted that encephalography, whilst primarily undertaken from a diagnostic point of view, may, in some trivial head injuries, be surprisingly curative. The pathology of those mild conditions is one of chronic cystic serous arachnoiditis; and the symptoms are dizziness and headache, made worse by any factor that raises the intracranial pressure, such as stooping, blowing the nose or passing a constipated stool. There are no abnormal physical signs. Penfield⁽¹⁹⁾ believes that

the therapeutic mechanism of air insufflation consists of the breaking down of the fine filmy adhesions, thus restoring the free circulation of fluid.

SCOPE OF ENCEPHALOGRAPHY.

From the foregoing, it will be readily understood that encephalography may afford invaluable diagnostic information in the following conditions: (i) Epileptiform symptoms following severe head injury or craniectomy; (ii) localized cerebral contusion, with consecutive brain atrophy, following minor head injury, without involvement of the cranial

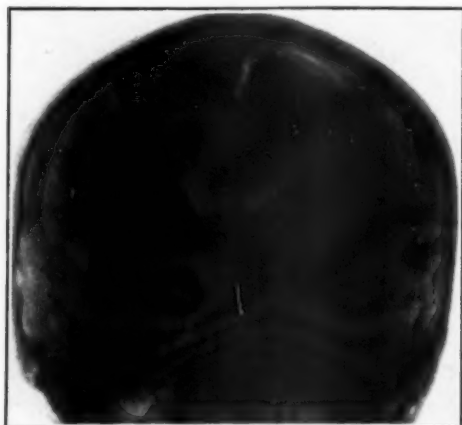


FIGURE IX. Case II. Postero-anterior view showing localized collection of air between the supero-medial area of the right cerebral hemisphere, the cranial vault and the *falx cerebri*. There is cortical shrinkage in the region, and decrease in the size of the right lateral ventricle.

vault; (iii) adhesive meningitis from whatever cause, producing blockage of the cerebro-spinal pathways and anatomical deformation of the basal cisternae; (iv) mental deficiency or deterioration, with or without gross structural intracranial abnormalities; (v) cortical shrinkages associated with senility; (vi) birth injuries and porencephaly.

We now submit short case records, with encephalograms, illustrative of the first four groups.

CASE I.—*Depressed fracture of the skull. Exploratory craniectomies. Nocturnal convulsions. Post-operative cortical adhesions with localized cyst formation. Excision of cyst and cortex. Cargile membrane inlay. Improvement. Subsequent bone graft. Cure.*

Bertie M., aged thirty-seven years, labourer, at the age of two fell off a balcony (distance unknown) on to his head. He was admitted to hospital, where

craniectomy was performed for depressed fracture of right parietal bone. Apparently he had no further trouble until at the age of twenty-one he was hit on the head with a bayonet, at the site of the old injury, whilst on home service duty during the Great War. One week afterwards he began to have fits. These convulsions occurred at varying intervals from one week to eight months. They were always nocturnal. He said that during his waking hours he was able to inhibit them by vigorously shaking his head. At the age of thirty-one he had another operation, when adherent *dura mater* was dissected from scalp tissue. He was free from fits for five months; but for the last six years they have been as bad as ever. The movements always affected the left side, the face apparently not being involved. The warning consisted of a feeling of oppression which invariably awakened him. The movements commenced as a fine fibrillary twitching of the left upper extremity, which spread to the left lower extremity. He then lost consciousness, the movements became more violent and were of the clonic type. The period of unconsciousness was half an hour and he awakened with a slight headache.

On examination the patient looked a healthy young man. He conversed normally and answered all questions in an intelligent fashion. There were bony irregularities and surgical scarring over the right parietal region. There were no abnormal neurological findings.

Encephalograms (see Figures VI and VII) showed a large area of bone missing from the right parieto-occipital region (the result of previous operations). In this situation there also appeared a large collection of air, divided in the centre, and incompletely shut off by arachnoidal adhesions. There was considerable cortical shrinkage, especially in the region of the missing bone.

At operation, under narco-local infiltration anaesthesia, an attempt was made to turn down a large osteoplastic flap which would include the area of the missing bone. However, the bone flap broke across the gap instead of at its base. The upper portion was then readily detached from the underlying *dura mater* until the area of missing bone was reached. Here the *dura mater* was densely adherent to the edge of the bone and the surface of the brain. With great difficulty these structures were separated, and while this was being done, a large cystic collection of cerebro-spinal fluid was opened into between the scarred irregular surface of the parietal lobe and the scalp flap, through which ran many dense pia-arachnoidal adhesions. This pathological area was then completely excised to a depth of three centimetres, and haemostasis secured. The edges of the bone were cleared and freed, the defect in the *dura mater* was repaired with Cargile membrane and the upper portion of the bone flap replaced.

The immediate convalescence was uneventful, and the patient left hospital with the remark: "I feel as though a weight has been lifted off my head." He

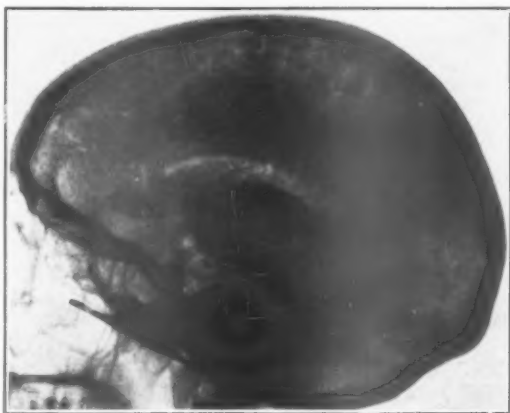


FIGURE X. Case II. Right lateral view showing increase of air in the region of the Rolandic and pre-Rolandic areas. The smaller clearer ventricular area is that of the right ventricle (nearer the film).

remained free from fits for about eight weeks, when he had a single nocturnal recurrence followed by two further fits in the next two months. These seemed to be associated with the application of pressure to the area of missing bone. X ray examination revealed the gap in the bone, together with non-union of the previous bone flap along the posterior border (see Figure VIII). It was then decided to fill in this gap with a graft of bone; and, at a second operation, under ether anaesthesia induced by the intratracheal method, the edges of the flap were again exposed. The Cargile membrane had formed an excellent substitute for the *dura mater*, which was neither indrawn nor adherent to the underlying cortex, although portion of it had worked its way up between the posterior border of the bone flap and the occipital bone, thus preventing union. This was removed, and the bone edges were freshened. The large gap was completely filled in with a single piece of the inner table of the right ilium, following the method of Pickerill.⁽²⁰⁾

Convalescence was uneventful, and up to the time of writing there have been no further convulsions.

CASE II.—*Trivial head injury in fronto-parietal region. Fits and transitory amnesia. Cortical scarring. Excision. Cure.*

Stella E., aged twenty-one years, a machinist, complained of fits for four years. Three months prior to their onset a portable gramophone had fallen on to her head from a height of approximately two feet. She did not lose consciousness, and there were no immediate complications or sequelae. The "fits" were of two kinds: (a) minor, which occurred frequently and consisted chiefly of transitory losses of memory, and (b) major, which were rarer and mostly nocturnal. There was never an aura, and the convulsions were generalized. During the last year these major fits had become more frequent, and



FIGURE XI. Case III. Antero-posterior view, showing normal ventricles. Note the increased amount of air over the regions of the islands of Reil, and the almost total absence of air over the hemispheres.

were now occurring once a fortnight. Prior to her accident, her health had always been good. She was a full-time baby, and the birth was a natural one.

On examination, she was a bright healthy looking girl of more than average intelligence. There were no abnormal neurological signs.

Encephalograms (see Figures IX and X) showed a localized collection of air and cortical shrinkage over the right cerebral hemisphere in the fronto-parietal region. The ventricles were well filled, the ventricle on the side of the lesion being smaller than its fellow on the opposite side. The subarachnoid pathways over the frontal lobe were enlarged, but only on the right side.

Under narco-local infiltration anaesthesia this region was explored by turning down a bone flap to expose the Rolandic and pre-Rolandic areas of the right cerebral hemisphere. The *dura mater* was normal, but on reflecting it, a white fibrous mass, like a scar, was seen on the surface of the superior frontal gyrus in front of the precentral sulcus. It had a diameter of about two centimetres and

was under the *pia mater*. The surrounding cortex was oedematous. This sclerosed area was found to extend into the substance of the brain for about five millimetres, and was completely excised. The *dura mater* was sutured and the osteoplastic flap replaced. Convalescence was uneventful.

The patient has had one convulsion, which occurred six weeks after operation, after accidentally knocking her head. Except for this incident, her health has been normal.

CASE III.—Headaches. Cerebral syphilis. Basal adhesions. Cisternal distortions. No operation.

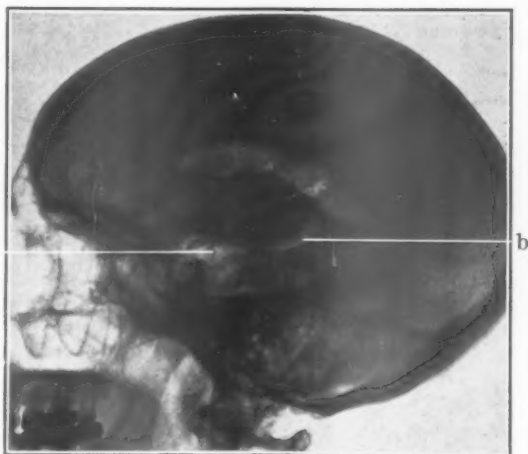


FIGURE XII. Case III. Right lateral view. a = enlarged *cisterna pontis et interpeduncularis*; b = enlarged *cisterna intercommunicans*. Again note the absence of air over the cortex and along the sagittal sinus.



FIGURE XIII. Case IV. Antero-posterior view (first encephalogram). Note enlargement of the ventricular system. The third ventricle is particularly well seen. (This exposure was made with the patient in the horizontal position; hence the lack of definition.)

Mrs. C., aged thirty-five years, domestic duties, had for twenty years suffered from headaches, worse at her menstrual periods, and situated in the occipital and left parietal regions. They had been very severe and most persistent for the last four years. Although there was no history of syphilitic infection, the Wassermann test applied to her blood one year ago had yielded a "+++" reaction. She had received intensive antisyphilitic treatment with considerable, though temporary, relief; and for three months prior to her admission the headaches had returned in all their pristine severity. On occasions, these headaches had been accompanied by vomiting. She had definitely noticed that the onset and cessation of her headaches were usually sudden.

On examination, there was a somewhat raised blood pressure of 160 millimetres of mercury systolic, and 110

millimetres diastolic. There were no abnormal neurological findings. The blood did not react to the Wassermann test, and lumbar puncture yielded clear fluid under increased pressure, which also failed to react to the Wassermann test. Cytological and chemical findings were normal. Skiagrams of the skull revealed



FIGURE XIV. Case IV. Left lateral view (first encephalogram). This film shows excessive amount of air over the frontal lobe and in the region of the *cisterna magna*. The tentorial edge is well defined (a). (Also made with the patient in the horizontal position.)

lying along the course of the fourth pair of cranial nerves, recently recognized and temporarily so-called by the American Committee on Standardization of Encephalography (quoted by Pendergrass⁽¹¹⁾), was definitely enlarged. There was a reduction in the amount of air over the frontal and parietal lobes and in the arachnoid villi along the sagittal sinus. Taken along with the raised intracranial pressure noted above, these findings indicated the presence of meningeal adhesions in the region of the basal cisternæ, probably due to old syphilitic mischief. The curious sudden onset and cessation of the headaches were probably due to transient and incomplete external hydrocephalus. As a result of these interpreta-

some hyperostosis, especially in the frontal region; and the coronal suture was not as well defined as usual. Encephalography was then undertaken. The initial pressure of the cerebro-spinal fluid with the patient in the horizontal position was 16 millimetres of mercury, which rose to 26 millimetres when the patient was placed in the vertical position. By careful pressure adjustments, 100 cubic centimetres of air were eventually introduced, the final reading being 12 millimetres of mercury with the patient in the vertical position. The films showed (see Figures XI and XII) that the ventricles were normal in size, shape and position. There were unusually large collections of air in the *cisternæ pontis et interpeduncularis*. The *cisterna intercommunicans*,



FIGURE XV. Case IV. Antero-posterior view (second encephalogram). Dilatation of the ventricular system, especially the third. Excessive air over the cortex of the hemispheres.

tions, no operative procedure was advised nor undertaken.

CASE IV.—*Convulsions three days after birth and failure of mental development. Ventricular enlargement and cerebellar aplasia. Occipital craniotomy. Gliosis of brain with mental deficiency. No improvement.*

Norman L., aged two years, was a firstborn child. The labour lasted forty-eight hours, forceps being applied during the end of the second stage. At birth on his head there were two slight bruises which cleared off in a few days. Bilateral congenital cataract was noticed. When he was three days old, his mother stated, he had generalized convulsions. They lasted for about six hours, and were finally relieved by hot baths and saline solution bowel irrigations. There had

been no recurrence of the convulsions and no illnesses of consequence; but mental and functional development had been retarded.



FIGURE XVI. Case IV. Postero-anterior view (second encephalogram). Ventricular enlargement with "winging" of posterior horns.

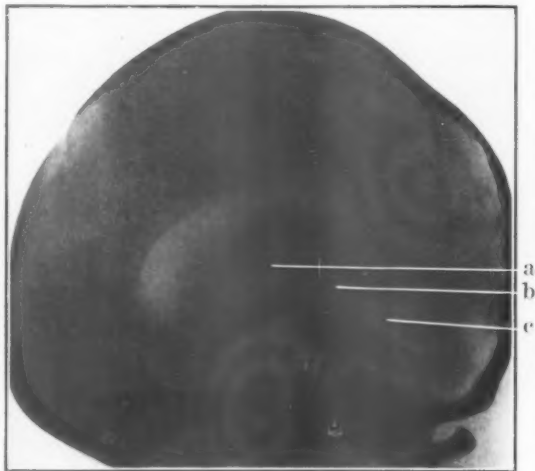


FIGURE XVII.¹ Case IV. Left lateral view (second encephalogram). Note: a = faintly outlined enlarged third ventricle, b = aqueduct of Sylvius, c = fourth ventricle. Dilatation of the basal cisternae is well shown.

On examination, he was unable to sit up without support, and could neither crawl nor walk. He could not speak, although he made inarticulate noises and cries. He was very restless. Both cataracts had been "needled", but vision was doubtful, and he rolled his eyes incessantly in an aimless fashion. There was a slight but general increase in the size of his head, which yielded a quivering sensation on percussion, not, however, of the typical "cracked pot" variety. The anterior fontanelle

¹ Figures XV, XVI and XVII were taken on the "Keleket" angulating counterbalanced head stand, belonging to the Professorial Surgical Unit at the Royal Prince Alfred Hospital, Sydney.

was widely open. When examined under an anæsthetic, the optic disks were normal. General neurological examination revealed no abnormality. Wassermann test of the blood and cerebro-spinal fluid gave no reaction. Under ether anæsthesia induced by the intrapharyngeal method, an attempt at ventriculography failed and cisternal puncture was performed. Clear fluid at a pressure of 16 millimetres of mercury flowed out freely. About 80 cubic centimetres were withdrawn and 50 cubic centimetres of air injected, under pressure control, with the patient in the horizontal position. Encephalograms were then taken (see Figures XIII and XIV). As the standard technique was not followed and the apparatus available at the time did not permit of the pictures being taken with the head in the upright position, they were, of necessity, unsatisfactory, but they revealed a definite enlargement of the ventricular system with shrinkage of the frontal cortex. The posterior fossa appeared to be relatively increased with upward displacement of the tentorium and excess of air in the *cisterna magna*. No operation was

advised at that time, owing to the vagueness of the interpretations. Six months later the child's condition had improved somewhat. He could sit up and was making endeavours to stand. He could not speak, but he had ceased making the inarticulate noises. His head was the same size, and there was again the indefinite quivering sensation on percussion. The anterior fontanelle had closed in considerably. Under ether anæsthesia induced by the open method, encephalography was again performed, on this occasion by the lumbar route and according to the standard technique, with the "Keleket" apparatus. The X ray pictures (see Figures XV, XVI and XVII) showed more

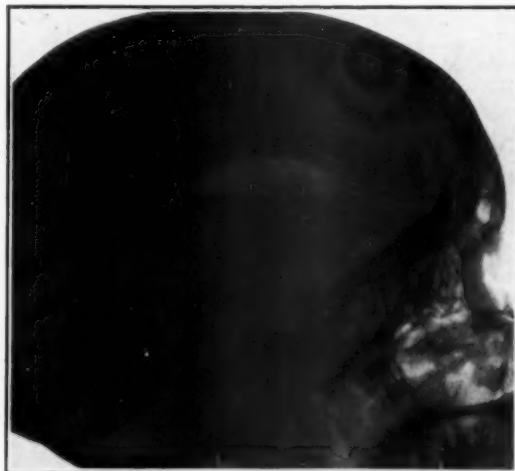


FIGURE XVIII. Case II. Lateral view. Taken two hours after the completion of encephalography. Note the re-absorption of the air in the cortical pathways, and the fluid level in the ventricles.

clearly the same enlargement of the ventricular system, especially the third and fourth ventricles, with relative diminution of the frontal cortex. Most of the air had remained in the large basal cisternæ.

No definite conclusions could be drawn from these findings, but they rather suggested the presence of an incomplete communicating hydrocephalus and cerebellar aplasia, possibly due to an old tentorial lesion. Two weeks later a right occipital osteoplastic flap was turned down and the tentorium explored. No definite lesion was found there; but the substance of the cerebrum felt unusually hard in irregular areas, and resisted the passage of a brain needle. An operative diagnosis of cerebral gliosis and cerebellar aplasia was made, which was confirmed by the pathological report on a portion of brain substance removed from the depths of the occipital lobe. Immediate convalescence was uneventful.

ACKNOWLEDGEMENTS.

It is our pleasure to acknowledge the helpful criticism and advice of Harold R. Dew, Bosch Professor of Surgery, the University of Sydney. Dr. B. P. Anderson Stuart kindly corrected the proofs of that part of this communication dealing with the radiological technique, and Dr. D. G. Maitland prepared the films for the blocks. By placing the facilities of the institution at our disposal, the matron and staff of the Saint Luke's Hospital, Sydney, made the commencement of this work possible before the adequate apparatus was available at the Royal Prince Alfred Hospital, Sydney.

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Surgical Technique.

THE USE OF THE PLANTARIS TENDON IN CERTAIN TYPES OF PLASTIC SURGERY.

By D. J. GLISSAN,
Sydney.

THE *plantaris*, when it is present, consists of a short belly and a long tendon of uniform diameter. The tendon is very accessible through two small incisions, and is readily removed without damage to itself or neighbouring structures. The muscle plays an unimportant part in the muscle economy of the limb and its action is not missed when the tendon is removed.

I used the tendon originally in repairing a crippling gap in some of the flexor tendons in the palm, and found it admirable for this purpose. A report of the case is appended.

Since then I have found it very well adapted for use as a living suture, especially in tendon transplantation about the *tendo Achillis*. I have used it also in repairing an old rupture of the coraco-clavicular ligament, and though the result after three months is highly satisfactory, this period is too short to enable one to draw conclusions as to its suitability for plastic work in this situation. I can report, however, that L. G. Teece, to whom I described my method, used it in a similar case and informs me that the result was equally as good as he had achieved previously using *fascia lata*.

In one case I anticipated using the tendon in following the main lines of Gallie's technique for remedying a slipping patella, but found the tendon too thin and used *fascia lata* instead. This patient had congenital *talipes equinus* and in all probability the attenuated state of the tendon was associated with the presence of this deformity. I should have no hesitation in using it for this operation when it was present and of good calibre.

The tendon has many advantages over *fascia lata* as a material for suture, notably its ease of handling and the saving of time and mutilation. The length of tendon available can be readily estimated by measuring from the middle of the calf at the level of the flexure of the knee, when the joint is flexed to a right angle, to the inner aspect of the insertion of the *tendo Achillis*.

It must be remembered that the muscle is not always present, so that when it is intended to use it, alternate areas should be prepared so as to enable *fascia lata* or another tendon to be available if the *plantaris* should be absent.

The Operation.

Make a five centimetre (two inch) incision parallel to the medial border of the *tendo Achillis* just above its insertion. Approach the *tendo Achillis* (see Figure 1).

The tendon of the *plantaris*, if it is present, will be found either slightly medial to the former tendon or clinging to its medial surface. Free it by gentle dissection as far proximally as possible.

Make a further incision 7.5 centimetres (three inches) in length along the inner aspect of the calf in its upper third. This incision should overlie the gastrocnemius muscle towards the anterior surface of the muscle. Incise the

deep fascia through the whole length of the wound. Gently retract the fibres of the gastrocnemius with the fingers until the anterior inner edge and surface of the muscle are reached and put in a retractor.

The tendon of the *plantaris* will be readily seen lying on the posterior surface of the soleus muscle. Free it by careful dissection as far as possible proximally and distally, and with a pair of curved blunt pointed scissors divide it as close to the muscle belly as possible. Close the fascia and skin in the upper wound. The tendon can then be drawn into the lower wound by gentle firm traction. It

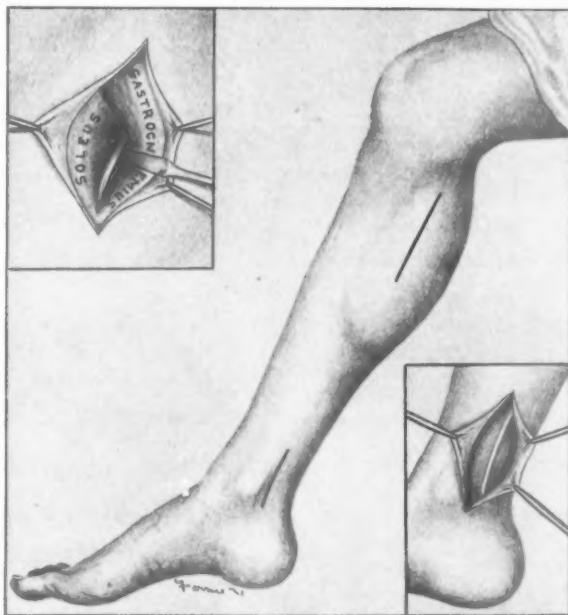


FIGURE 1. Illustrating operation for removal of *plantaris*.

may be removed at once and the wound can be closed, it may be left attached by its insertion, or it may be detached and left coiled in the tissues to prevent it from drying until it is ready for use.

Case Report.

The following is a report of a case of tendon grafting by use of the tendon of the *plantaris*.

On July 1, 1927, H.K., a male, aged fifteen years, was severely wounded in the right palm by the discharge of a shotgun. He was admitted to the Royal Prince Alfred Hospital for emergency treatment, removal of pellets *et cetera*.

Two months later he attended my clinic for treatment of his resultant deformity. At this time the palm was occupied by a newly healed scar. The thumb and forefinger were intact. The middle, ring and little fingers were fixed in hyperextension at their metacarpo-phalangeal joints, and all trace of active flexion at these and the interphalangeal joints was lost in these digits. It was clear that the superficial and deep flexor tendons to these fingers had been destroyed in the palm.

Sensation in these digits, however, was intact, and on this account it was decided to make an effort to secure some return of motor function in them. A long period of waiting was decided upon to minimize the chance of lighting up the original septic infection by operation, and the interval was utilized to try as far as possible to prevent the deformity of the fingers from becoming excessive.

On August 8, 1928, the following operation was carried out. As a preliminary the very efficient operation designed by Gordon Shaw⁽¹⁾ to overcome extensor contraction at the metacarpo-phalangeal joints was carried out in the case of the

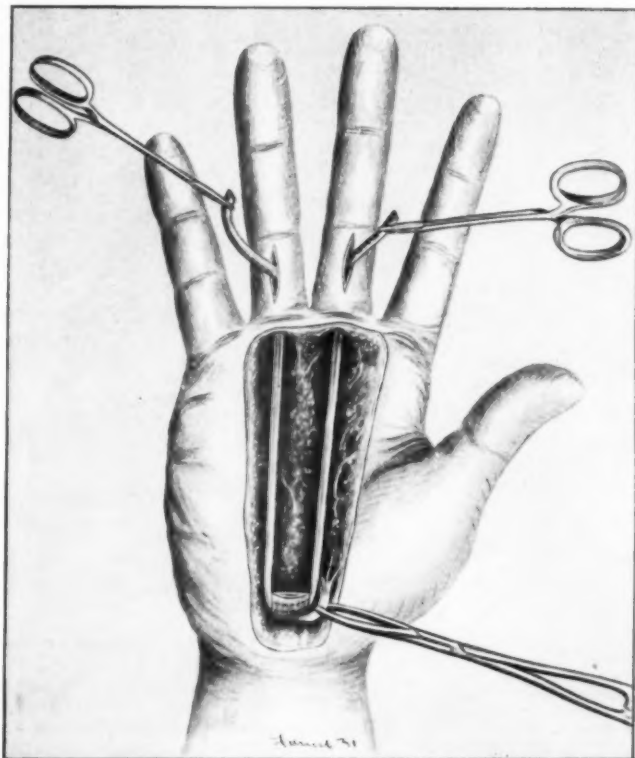


FIGURE II. Showing operation on palm of hand.

middle, ring and little fingers, so that they were allowed to be flexed readily to a right angle at the joints in question.

The scar tissue was removed wholly from the palm. The stump of the flexor group of tendons in the anterior carpal tunnel was freed from all scar and freely mobilized after the median nerve had been isolated and suitably retracted. The proximal ends of the flexor sheaths of the affected fingers were opened by dissecting away every trace of scar tissue.

It was then decided to use the following method to graft the ring and middle fingers only and to disregard the little finger, which could be amputated

later if necessary. A longitudinal stab incision was made over the palmar surface of the proximal segment of the middle and ring fingers so as to pierce the flexor sheaths and the enclosed tendon stumps. The *plantaris* tendon, having been secured as described, was threaded on a Gallie's needle to enable it to be passed into the sheath and through the tendon stumps of the middle finger, and to be brought out through the base of the sheath. A suture was so placed as to secure together the recipient and entering tendons.

The needle was then passed through the stump of the flexor tendons from side to side as it lay free in the carpal tunnel, and the *plantaris* tendon was brought through it; the *plantaris* tendon was then passed into the open base of the ring flexor sheath so as to transfix the enclosed tendons and to emerge through the stab wound. It was then drawn sufficiently tightly to pull the flexor stump towards the palm and maintain the metacarpo-phalangeal joints fully flexed. A suture was placed as in the case of the middle finger. The free ends of the *plantaris* were cut off and the stab wounds closed. The wound in the palm was closed by undercutting the edges, and the hand bandaged in the closed position over a bundle of soft dressings. Figure II shows diagrammatically the treatment of the tendon in relation to the middle and ring fingers.

The patient had to be removed to isolation within a few days after operation, since he developed mumps, and was left largely to his own resources as far as after-treatment was concerned. His wound healed without incident, and he was encouraged to carry out active movements of his fingers after ten days.

His condition at present can be best described by quoting his answers to a questionnaire dated June 9, 1931, and some passages of a covering letter. A tracing of an outline drawing of the middle and ring fingers which he forwarded to show the extent of his extension range at the interphalangeal joints is also appended (see Figure III).

Q.: Can you bend the fingers tightly into the palm as in closing the hand? A.: No. Half-way.

Q.: Do you use the middle and ring fingers in addition to the forefinger in gripping? A.: Yes, equally as good.

Q.: Does your little finger worry you? A.: No. . . . I have the use of my hand. I can carry a kerosene tin full of water with it. My grip is good. The work I do is farming, cutting wood. I can play a good game of tennis, also cricket. . . .

It is to be remembered that the movement of this patient's fingers is mainly at the metacarpo-phalangeal joints, and that it is through the firm attachment of the flexor stump to the distal ends of the *flexor profundus digitorum* through the *plantaris* graft that he gets his strong grip.

Summary.

1. Attention is drawn to the suitability of the *plantaris* tendon for use as a living suture and in tendon grafting and repair.

2. An operation is described for determining the presence of the tendon and removing it.

3. A case is reported in which the use of the tendon to repair a large gap in some of the palmar flexor tendons has been followed by very satisfactory results.

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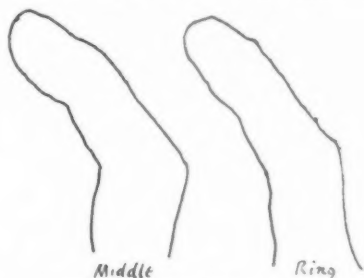


FIGURE III. Showing range of movement in fingers.

A NOTE ON THE LATERAL POSITION.

By HUGH C. TRUMBLE,
Melbourne.

THE fixation of an anesthetized patient in the lateral position is always a matter of some difficulty. The main source of trouble is the under shoulder. If the trunk is placed so as to rest on the hip and the point of the shoulder, it is in a most unstable position and tends to topple forwards or backwards. The many forms of apparatus which have been designed to prevent this are only partly

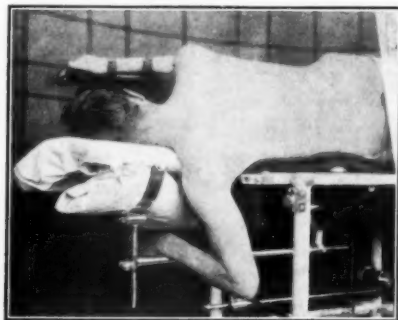


FIGURE I. The head section of the table has been removed and the author's head rest substituted in its place. A gap is thus provided through which the patient's arm passes. All danger of pressure on the axillary nerves and vessels is eliminated. The position is characterized by stability and comfort. A small firm pillow may be introduced at the waist level to effect lateral bending of the spine if such is desired.

successful. The arm is another source of annoyance, and unless care is taken there is some danger of damage to nerves from long continued pressure.

So long as the arm and shoulder rest on the table, the disadvantages mentioned will be more or less to the fore.

Removal of the arm and shoulder girdle would vastly improve matters, but this would be somewhat too radical a procedure. Another method of evading the difficulty is to remove part of the surface of the table so that the arm and shoulder may pass through. By this manoeuvre the lateral surface of the thorax is brought in contact with the surface of the table and all possibility of compression of the arm is eliminated. Most tables are not provided with a suitable gap. In many, however, the leg section is divided longitudinally and by dropping one half a space is provided through which the arm may pass. The head is supported on the other half, a suitable pillow being interposed. The arm is slung by a bandage. The upper arm and the legs are placed and supported as in the

older methods. If it is desired to arch the spine laterally, a soft pillow, much smaller than is necessary when the shoulder rests on the table, is introduced at the waist level. When the operation of thoracoplasty of the Sauerbruch type is to be performed, the affected side is placed underneath. Thus the danger of



FIGURE II. The leg section of this table is divided longitudinally. One half is dropped. The patient's head rests on the other half.

aspiration of pus from the diseased into the sound lung is minimized, and the latter is left free from pressure. Retraction of the scapula on the side of operation is facilitated.

The position is characterized by stability and comfort. The provision of a suitable gap in all operating tables would be a distinct advantage and could be effected quite easily.

TREATMENT OF VARICOSE ULCERS.

By C. J. OFFICER BROWN,
Alfred Hospital, Melbourne.

THE ætiology of varicose veins is a much discussed and still unsolved problem. We cannot prevent their occurrence, and once they have developed we cannot restore the veins to their normal condition.

When a vein becomes varicose, its wall is thinned and stretched, and as a result of this the vein becomes elongated and consequently tortuous. More important than elongation is increase in diameter leading to incompetency of the valves.

The heart's thrust, reinforced by the elastic recoil of the arterial walls, carries blood through the arteries into the capillaries, but is completely dissipated in the extensive thin-walled capillary system, and return of blood to the heart is dependent on other factors, and in the erect position is a step-ladder progress from valve to valve up the veins. The forces behind this venous circulation are: (i) massage of the veins by muscular movements; (ii) the elastic recoil of the closed tubes of skin and deep fascia following the periodic stretching by the arterial thrust; (iii) the suction effect of respiration on the abdominal vessels when the diaphragm rises in expiration. These three forces are effective in any vein only so long as the valves are competent. In the recumbent position gravity drainage aids the return of blood to the heart.

The veins of the lower limb may be divided into a deep system contained within the tube of deep fascia and a superficial system between the deep fascia and the skin, and these two systems are joined by veins which perforate the deep fascia.

When the superficial veins are varicose some of the blood pumped up the deep veins will flow along the communicating branches into the superficial veins, and in the absence of effective valves will drop back under the influence of gravity, so that the circulation in varicose veins will be from above down instead of from below up. If the whole column of superficial veins is incompetent, this reverse circulation will greatly interfere with the circulation of the limb, and should the deep veins be varicose as well, or thrombosed, there will be no efficient venous drainage from the limb and it becomes tense, swollen and water-logged.

With limited varicosities the interference with circulation is correspondingly limited.

The limb with varicose veins is never normal. It swells more or less when the patient stands and aches and tends to be discoloured. So long as the deep veins are intact, complete relief from symptoms can be assured if the reverse circulation in the superficial veins is checked, and this can be done either by blocking or removing the veins by injection or operation, or by providing firm elastic support with an Unna's stocking or an elastic bandage. Applied in the recumbent position with the leg drained of blood, the stocking will keep the superficial veins collapsed when the patient stands erect.

Varicose ulceration is simply the result of trauma to the skin in a limb whose circulation is inadequate. The poorly vitalized skin is killed by a relatively minor trauma and destruction altogether out of proportion to the trauma results.

Repair is correspondingly slow, and now the œdema and congestion of the inflammatory process are added to the varicose œdema. In addition, as pointed out by Maclure,¹ there is now a hole in the elastic tube, and this lack of support further embarrasses the local venous drainage. Discharge from the ulcer is often excessive and is simply a leak of œdema fluid through the hole in the skin. Superficial saprophytic infection is inevitable and the discharge becomes purulent and foul, but deep infection is rare and the problem of treatment is largely mechanical.

If the leak is stopped and the œdema relieved, the ulcer becomes clean and will rapidly heal. Untreated, the ulcer tends to spread until a state of equilibrium is reached, and may completely ringbark the leg. Its edges become hard and calloused and the surrounding area of skin is tense and discoloured.

Recumbency with the leg elevated leads to rapid improvement, because the circulation is restored by the action of gravity and the œdema drains away and the leak is lessened.



FIGURE I. First strip of bandage applied.¹



FIGURE II. Second strip of bandage applied.

The same result can be obtained with equal facility by a properly applied Unna's stocking, and this method has the advantage that active muscular movements greatly improve the circulation and the tone of the whole limb.

All varicose ulcers can be healed by elastic pressure alone, and can be kept healed by elastic pressure. In using the method minute attention to detail is essential. Two principles must be borne in mind. First, it is necessary to support the veins that are causing the œdema, and, secondly, it is necessary to bring pressure to bear on the ulcer to stop the leak and to squeeze out the surrounding œdema.

The Unna's paste stocking is used as the basis of treatment. It is applied from the roots of the toes to just below the knee with the patient in the recumbent position and after the leg has been elevated for drainage. The stocking must be applied very firmly and with a pressure which is maximal over the foot and the ulcerated area, and may then gradually lessen as it ascends the calf. Even

¹ Figures I-VII show the method of applying Unna's stocking. The leg is first coated with Unna's paste; this is omitted in the photographs for the sake of contrast.

tension must be maintained on the bandage and great care taken to avoid a tourniquet effect. For a large ulcer with thick calloused edges enormous pressure must be applied.

Various methods are employed to apply pressure to ulcers in particular situations, and if it is realized that pressure to stop the leak is the secret of success, methods of obtaining this end may be left to the ingenuity of the surgeon. Elastic pressure alone will cure the ulcer, but injection of veins is a valuable supplementary method. Often round the calloused margin of an ulcer one or two soft grooves can be felt in the cartilaginous surrounding area. These grooves contain veins, and they often correspond to the tender points round the margin of the ulcer. They can be readily thrombosed by a small injection of quinine and urethane into each one, and this will give rapid relief of pain and seems to hasten the healing of the ulcer. After the ulcer is healed, a hard area often remains at its site and injection of veins in the region is followed by softening and improvement of this area.



FIGURE III. Third strip of bandage applied.



FIGURE IV. Foot completely covered.

Injection of veins more distant from the ulcer does not hasten the healing of the ulcer if the stocking is properly applied, but it is well to do this during the course of stocking treatment in the hope that when the ulcer is healed the circulation may be sufficiently improved to render further ulceration unlikely. Once healed, the ulcer can be kept healed by elastic pressure. Unna's stockings may be used and can be left in place for about six weeks, but bathing is difficult and reapplication is irksome. An elastic stocking is effective, but it must be well made and accurately fitted and renewed at least every four months, as the elastic perishes in this time and the stocking is then useless. If, as the result of injections, the oedema and congestion are relieved and the indurated area disappears, elastic support may be dispensed with, but careful watch must be maintained in case recurrence of varicosity should lead to reappearance of the pre-ulcerous state.

Operation on the veins is, of course, an alternative, but is a much more serious procedure than injection, is more dangerous and will often be rejected by the patient. If a vein can be treated by operation, it can be injected.

Technique of Treatment.

The patient lies on a couch with the heel supported on a foot rest about 25 centimetres (ten inches) high. Discharge is wiped away and the skin surrounding the ulcer is cleaned with methylated spirits. A piece of lint is cut to the size and shape of the ulcer and is "battered" on its smooth surface with zinc cream and placed on the floor of the ulcer. If the crater is deep, several layers of lint and zinc cream are placed on top of the first piece until the crater is flush with the surface, and finally one or more pieces just larger than the ulcer are applied so as to overlap its margins. The whole leg from the toes to just below the knee is now painted with Unna's paste which has been melted by heating in a water bath. The bandage is then applied in strips, as shown in Figures I to VII, until the heel and foot and lower part of the leg, including the ulcer, are com-



FIGURE V. The first turn round leg.



FIGURE VI. The second turn round the leg in reverse direction.

pletely covered. In covering the leg the bandage is allowed to follow the natural curves, and must be cut and a fresh start made whenever it becomes difficult to continue with a uniform tension on the whole width of the bandage. Strips of bandage are applied alternatively from right to left and from left to right, and a firm interlocking stocking is built up and the whole skin area is eventually covered with an even tension. The stocking must be tight and for the large, deep, hard-edged ulcer it cannot be too tight, provided it is applied with equal firmness from the roots of the toes to above the ulcer. On no account must a tourniquet effect be produced, and this is best avoided by using 7.5 centimetre (three inch) bandages and taking care to keep the tension even across the whole width of the bandage. Sometimes on the dorsum of the ankle, or where there is an hour-glass narrowing at the site of a large ringbarking ulcer, a 7.5 centimetre bandage "bridges" from its edges and is too wide to lie flat. This can be overcome by nicking the sides of the bandage so that it will lie flat in the hollow. For ulcers

situated on a flat or cylindrical surface nothing further is required. There may be some pain with the first one or two stockings, and the patient should be warned about this and advised to come to have the stocking changed in four or five days if the limb is painful or the stocking much soiled with discharge. After this there is no pain, and the stocking requires changing only once a week. The patient is amazed at the improvement in the ulcer and the relief of discomfort, and becomes a willing cooperator in the treatment. In changing the stocking, the patient is placed on a couch with the leg elevated before the stocking is cut off, and while it is off the leg is never allowed to hang down. Each time the ulcer is seen to be smaller and its edges are softer and flatter.

Discharge from an ulcer does not contraindicate treatment with Unna's paste. If discharge is excessive and malodorous, it may be necessary to change the stocking more frequently for the first two or three weeks, but it will rapidly lessen as the leak is blocked by pressure and preliminary treatment by fomentations, and recumbency is rarely necessary.



FIGURE VII. Completed stocking.

Sometimes, as in the case of ulcers below the internal malleolus, the situation of the ulcer makes it impossible to apply even pressure with a flat stocking, and it is necessary in these cases to place a pressure pad over the ulcer before the stocking is applied. Sometimes the pad is made by building up the ulcer with lint and zinc cream and placing several layers of lint on top until a sufficient thickness is obtained. Sometimes a piece of rubber bath sponge impregnated with Unna's paste is used, or, if the paste is sufficiently firm, a lump of paste may be so applied. Sometimes a small rubber balloon filled with water is used.

These small malleolar ulcers are often very painful, and are much more difficult to heal than the larger ulcers on the medial surface of the leg, but they will all get well and firm pressure will relieve the pain in a few days.

Obvious varicose veins are injected from week to week when the stocking is changed, but for this purpose the leg must not be allowed to hang down until the ulcer is healed. When the ulcer is healed, any remaining veins are dealt with, and for these smaller veins it is easier to have the patient standing while the needle is inserted, but the recumbent position is assumed before the injection is made. Particular attention is given to the edges of the ulcer and veins that appear to run under the ulcer bed are injected as soon as the area is sufficiently clean.

For injection we use quinine and urethane solution, starting with a first injection or injections totalling not more than one cubic centimetre. If there is no abnormal reaction to this injection, a total of two to three cubic centimetres may be given at each subsequent sitting. We do not use a tourniquet.

When the needle is in place and before the injection is given, the vein should be emptied of blood as far as possible by getting the patient to lie down so that the solution is not diluted by blood before it comes in contact with the walls of the vein. After injection the patient should remain recumbent until a stocking has been applied.

Acknowledgement.

My thanks are due to Mr. Fay Maclure for much help and advice in the treatment of these cases and in the preparation of this paper.

Supplementary Note.

Since this paper was prepared for publication in August, 1930, "Elastoplast" bandages have been highly recommended by Dickson Wright⁽²⁾ and others, and we have tried them with great satisfaction. They are simpler to use correctly, but we do not find them more efficient than a properly applied Unna's stocking, and as they are more expensive, we still use the Unna's stocking as a routine measure in our hospital practice. The underlying principles are the same for both methods of treatment.

Further experience has confirmed our confidence in quinine and urethane for the injection of varicose veins, and we rarely use any other substance.

References.

⁽¹⁾ Fay Maclure: "Chronic Ulcer of the Leg", *The Medical Journal of Australia*, January 9, 1926, page 29.

⁽²⁾ A. Dickson Wright: "Treatment of Varicose Ulcer", *The British Medical Journal*, December 13, 1930, page 996.

⁽³⁾ A. Dickson Wright: "Varicose Ulcers", *The British Medical Journal*, September 26, 1931, page 561.



COLON SURGERY: SIGMOIDECTOMY, WITH PRESERVATION OF NATURAL FUNCTION.

By H. B. DEVINE,

Honorary Surgeon, Saint Vincent's Hospital, Melbourne.

It becomes a difficult problem in surgical technique to preserve the natural evacuating function of the bowel: (i) when the whole of the sigmoid and perhaps part of the descending colon are removed; and (ii) when it is necessary to resect the lower half of the sigmoid and the upper part of the rectum for a carcinoma in the lower part of the sigmoid. In the first instance this extensive colonic resection may be necessary for: (a) an extensive carcinoma involving the whole of the sigmoid; (b) carcinomatous disease of one limb of a big sigmoid which lies in contact with the other limb and affects it by a continuous spread of the primary growth; (c) that form of extensive inflammatory obstructive tumour involving the whole sigmoid, which is caused by diverticulitis. In such cases, after a complete resection it is impossible to connect up the divided ends of the bowel. In the second instance, a resection of the growth in the lower part of the sigmoid leaves above a small calibre peritoneal covered bowel end and below a very large calibre non-peritoneal covered rectum. In the narrow, cramped space, end-to-end suture is mechanically almost impossible. In addition, the disparity of the lumens of the bowel ends, the absence of peritoneum on the rectum, and the septicity of the faecal contents make the chances of end-to-end union almost impossible, even if it could be mechanically carried out. In circumstances such as I have indicated above the custom has been to leave the patient with an artificial anus. In the case of an inflammatory tumour caused by diverticulitis, the patient is then afflicted with this artificial anus for the rest of what may be a long life. Even when a late carcinoma renders this extensive operation necessary, the patient may live for years because of the comparative beneficence of colon carcinoma. It is, therefore, obviously a great boon to such patients and an advance in the art of surgery if, without increasing the danger to the patient, some way can be found to reconstitute the continuity of the bowel and preserve the natural function.

In this contribution I propose to report the histories of three patients, in order to illustrate the phases of this problem in the technique of colon surgery, and then to describe in each case the steps of the technique which were used.

Obstructive Inflammatory Tumour of the Whole Sigmoid.

Mrs. D., aged fifty years, complained that she had suffered from severe constipation during the last six months. This had increased, and had become so bad that she could obtain a movement of her bowels only with repeated enemata. She also complained of severe colicky pains. These were associated with some distension, and were relieved when an evacuation of her bowels was obtained. There was tenderness over the left iliac fossa, where a tumour could be felt. X ray examination disclosed an obstructive condition in the sigmoid, which was thought to be a carcinoma.

Operation was necessary because she had a large tumour in the sigmoid region and because her bowels were almost completely obstructed.

Operation.

At operation a large and apparently quite inoperable growth was found. This was assumed to be carcinoma. The ureters were dissected out of a solid mass, and with great difficulty the growth was finally removed. It was then seen that the whole of the sigmoid and the lower part of the descending colon had been resected, and that it was impossible to join up the divided ends of the bowel. Therefore, all that could be done was to close the end of the bowel divided at the recto-sigmoid junction with two layers of catgut sutures, and to suture the cut end of the descending colon into an opening in the abdominal wall, so as to



FIGURE 1. Shows the sigmoid removed, the cut end of the descending colon implanted into the loin in order to form an artificial anus, the peritoneum of the posterior abdominal wall and the stump of the rectum sutured. (Recumbent posture.)

form an artificial anus (see Figure 1). It was noticed at the time of the operation that the most dependent part of the transverse colon was not low enough to unite to the rectal stump.

To our surprise, the pathologist reported that the condition was non-malignant, and that it was a diverticulitis. With this knowledge, it was then obvious to us that there was no possibility of a recurrence, and that the patient might live a great number of years. On learning this, the patient was intensely dissatisfied with the prospect of having an artificial anus for the rest of her life, and she asked us to take any risk to reconstitute the continuity of the alimentary canal and restore natural function.

Many months later the patient was radiographed to see how near, in the upright position, the most dependent part of the transverse colon was to the rectal stump. It was then seen that the transverse colon was acting as a reservoir for faeces, and that it had become very much enlarged as a result of the increased function.

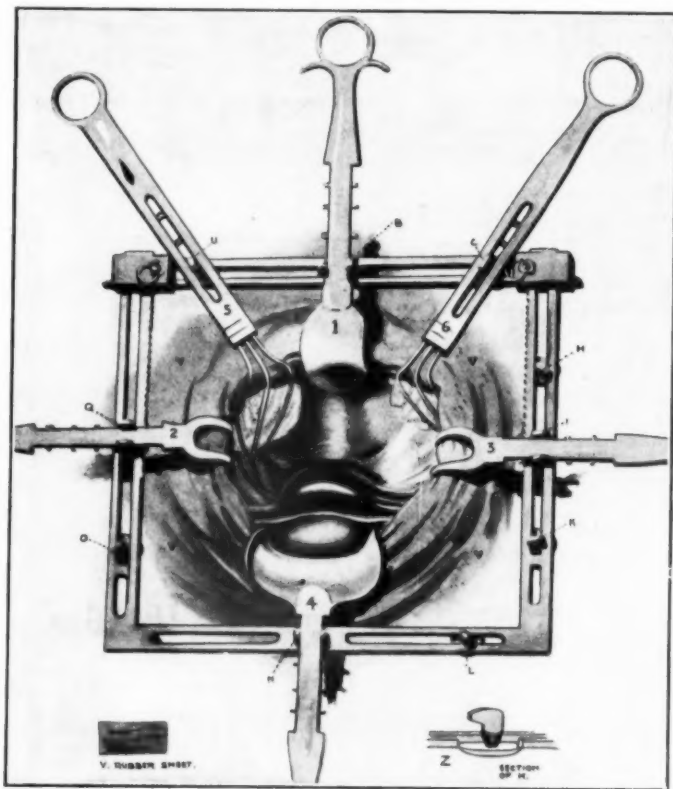


FIGURE II. Retractor set for operation. The incision is in the lower part of the abdominal wall. The edges of the wound are covered with rough glove rubber or towels. "Mechanical hands" 5 and 6, with soft scarves acting as buffers, keep the intestines well out of the wound and well up into the abdominal cavity. The pelvis is empty except for the rectum, uterus and its adnexa. Z, section of a single hook to show how these jam and fix the "mechanical hands". (Reproduced by courtesy of *Surgery, Gynecology and Obstetrics*.)

It was now thought that the transverse colon, with the extra function put on it under the altered circumstances, would eventually become sufficiently dependent to connect to the rectal stump. With this end in view, the artificial anus, which was already slightly constricted, was allowed to become more constricted, and the patient was allowed to become habitually constipated. An X ray

examination at the end of eighteen months showed that the transverse colon was now much lower than previously, and that it now appeared possible to anastomose the lowest part to the stump of the rectum.

Technique of Operation for Restoration of Natural Function.

1. The anus was stretched and the rectum washed out.
2. The abdomen was opened by a mid-line incision extending from the pubis to the umbilicus.
3. The edge of the wound was protected by towels and a self-retaining retractor (Devine) was inserted (see Figure II).
4. By means of soft scarves and "mechanical hands", the small intestines were separated from the scene of the operation (see Figure II).
5. The patient was placed in high Trendelenburg position.
6. The most dependent part of the colon was now brought down to the rectal stump and fixed in position with stay sutures, which were clamped on to the retractor.

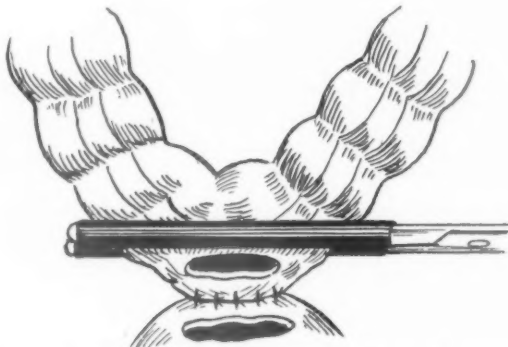


FIGURE III. Slender ribbon clamp placed on the colon to prevent escape of contents. Interrupted sutures uniting colon to rectum. Incisions in colon and rectum.

7. Two layers of number one tanned catgut sutures were now used to unite the colon to the rectal stump. The sutures were not allowed to penetrate the mucous membrane.
8. In order to prevent escape of its contents, a very slender ribbon clamp was now placed on the colon (see Figure III).
9. Openings were now made in the colon and rectum, and both openings were carefully cleaned with antiseptics.
10. The anterior rows of sutures were now inserted, and care again taken not to penetrate the mucous membrane (see Figure IV).
11. A drainage tube was now placed close to the anastomoses and brought out of the abdominal wound.
12. The abdominal wall was closed in the usual way.
13. Three months later, under local anaesthesia (a 1% solution of "Novocain"), the artificial anus was dissected from the skin and the muscle, the parietal peritoneum separated from the abdominal wall, but left attached to the edge of the bowel opening, the opening in the bowel closed with tanned number one catgut sutures, and the bowel allowed to drop back. The muscles and skin were then very loosely coapted.

The subsequent history of this patient is that she is now quite well, and has had normal function for the last five years.

Carcinoma Involving Both Limbs of Sigmoid.

Mr. C., aged fifty-five years, suffered from obstinate constipation, colicky pains in the abdomen, associated with distension, anorexia and considerable loss of weight. The constipation alternated with diarrhoea, and he had severe attacks of vomiting. On examination, he looked very ill, and a large tumour could be felt in the left iliac fossa. A diagnosis of carcinoma of the sigmoid was made.

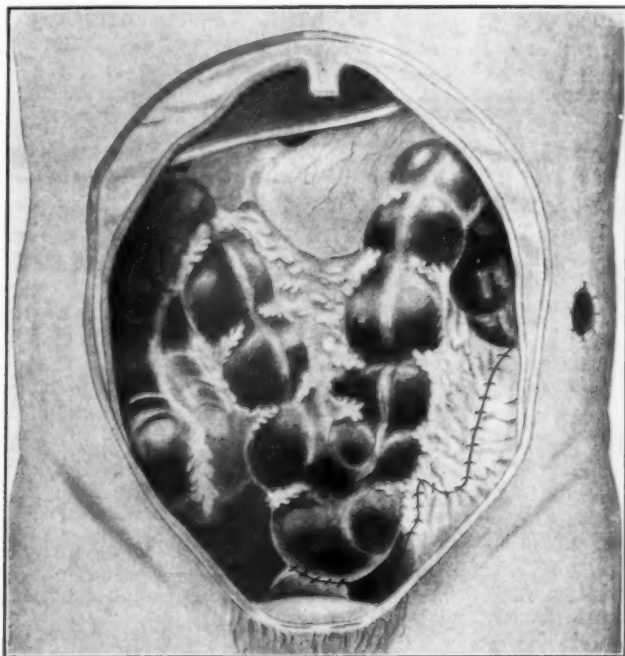


FIGURE IV. Shows the dependent transverse colon united to the stump of the rectum.

Operation.

At the operation it was found that there was a carcinoma of the sigmoid which involved practically the whole sigmoid, and which was adherent to adjacent loops of small intestines. The lower part of the descending colon, the whole of the sigmoid as far as the recto-sigmoid junction, the mesenteric leaf and its glands, and the adherent sections of the small intestines were removed. The divided end of the descending colon was sutured to the skin of the loin to form an artificial anus, and that of the distal segment, which was situated at the recto-sigmoid junction, was closed by two layers of number one tanned catgut sutures.

In three weeks the patient was discharged from hospital.

At the end of three months his general condition had very greatly improved. He was then readmitted with the view of restoring the continuity of the alimentary canal, which, for very special reasons, was desired. As the transverse colon in the male does not normally lie as low as in the female, there was very little chance that it would ever become dependent enough to anastomose with the rectum. Continuity was therefore restored in the following way.

The early steps of the operation (1 to 5) were the same as in the first case.

6. A small split-muscle incision was made into the peritoneal cavity at McBurney's point.

7. A small Payr clamp was inserted through this opening and made to grasp the terminal ileum at a point about 7.62 centimetres (three inches) from the ileo-caecal junction.

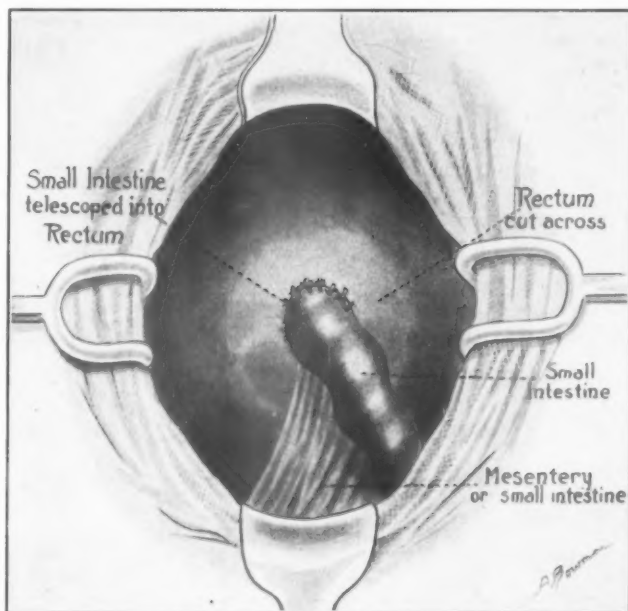


FIGURE V. Ileum telescoped with the stump of the rectum.

8. An intestinal clamp was now placed on the ileum, proximal to the Payr clamp, and the intestine divided between the two clamps.

9. The distal ileal colon end was drawn through the small opening in the right iliac fossa and sutured to skin.

10. An opening about 2.5 centimetres (one inch) in diameter was now made in the rectal stump.

11. The edges of the cut end of the proximal ileum were now fixed by four stay sutures to the edges of the opening in the rectal stump.

12. A series of number one tanned catgut interrupted sutures were now inserted, uniting the seromuscular layer of the ileum to the peritoneum and muscle layer of the rectal stump. A second series of interrupted catgut sutures was now

inserted. In this way the terminal ileum was telescoped into the rectal stump (see Figure V).

13. The abdominal wall was closed in the usual way.

Ten days later a tube was inserted into the ileal fistula, and the contents of the colon were washed out through the artificial anus. The openings B and C (see Figure VI) then became two mucous fistulae, and required very little attention on the part of the patient.

Very soon the terminal ileum appeared to assume some of the absorbing function of the colon, for the patient's bowel actions were soon reduced to three

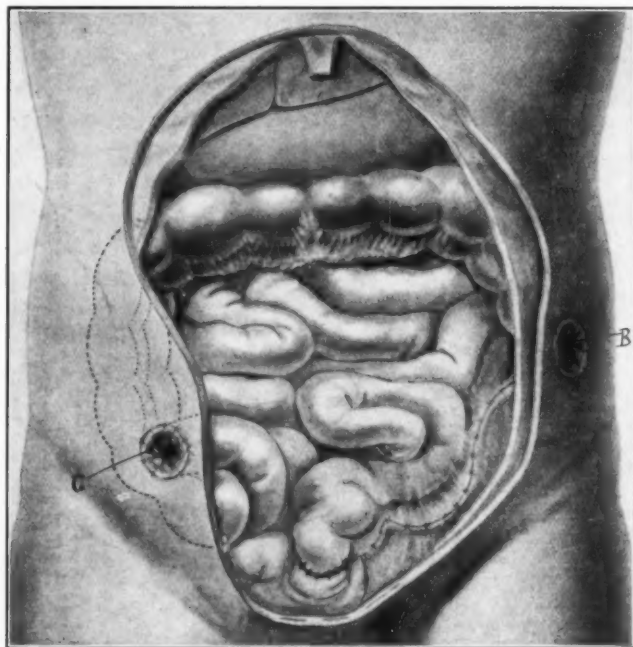


FIGURE VI. Shows the cut end of the distal ileum segment implanted into the right line in order to form a mucous fistula (C); it also shows the cut end of the descending colon implanted into the left line to form a mucous fistula (B).

a day. The patient lived comfortably for between three and four years, during which time he held a prominent position.

Carcinoma of the Lower End of the Sigmoid.

The problem of preserving the natural evacuating function of the bowel also occurs in the resection of bowel which is necessary for a carcinoma of the lower part of the sigmoid. This problem is well illustrated by the following case.

A very debilitated and emaciated man, aged sixty years, was admitted to hospital for acute intestinal obstruction. There was much distension, and he had all the usual symptoms of an acute intestinal obstruction; it was obvious

from the history and examination that the cause of the obstruction was a carcinoma of the sigmoid. He had a high percentage of sugar in his urine and was a diabetic. He was, of course, a very "bad risk".

Operation.

The steps in the surgical management of this very serious condition were as follows:

1. The patient was given insulin and glucose intravenously and rectally.
2. An incision was made in the mid-line in the lower part of the abdomen. Exploration through this revealed that there was a carcinoma in the lower segment

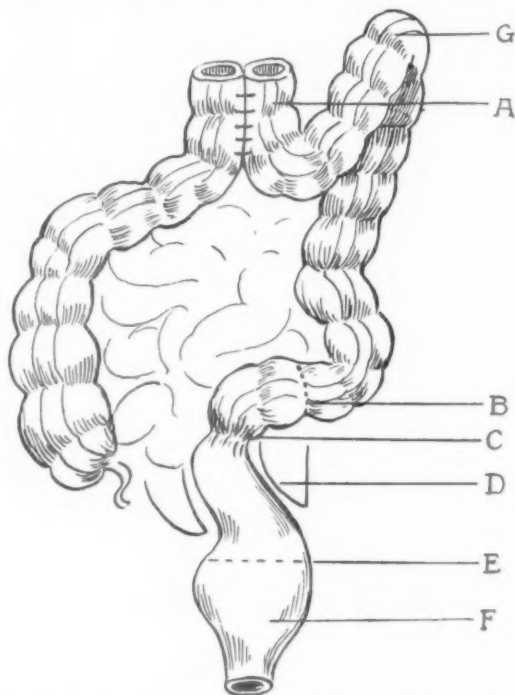


FIGURE VII. (Diagrammatic.) A = transverse colostomy made by division of bowel after suturing adjacent limbs together. B = line of division of sigmoid. C = growth. D = reflection of peritoneum from rectum to pelvic wall. E = line of division of rectum.

of the sigmoid, that the growth was operable, and that there were no glands or secondary growths in the liver.

3. A small opening was now made into the abdominal cavity through the rectus muscle, half-way between the umbilicus and the rib margin. Two Kochers clamps were now introduced into this opening and made to grasp the transverse colon, side by side. By means of these clamps the transverse colon was now drawn through the wound. The adjacent limbs of the loop were now approximated

by sutures, and the colon divided by the cautery between the clamps and the cut ends fixed into the wound by sutures (see Figure VII). Thus an artificial anus with a very big spur was formed in the transverse colon.

Three weeks were now allowed to intervene so that the patient might recover from his intestinal obstruction and be treated for his diabetic condition.

4. Under Kirchner's zonal method of spinal anaesthesia, the sigmoid was divided in the middle, the peritoneum reflected from the pelvic floor, the rectum

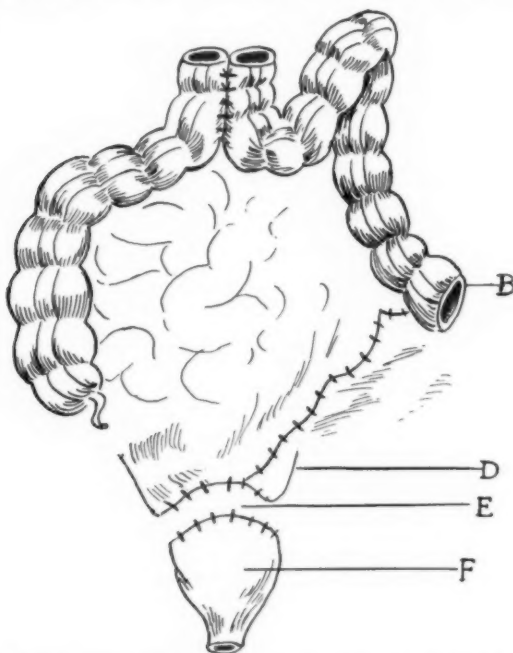


FIGURE VIII. (Diagrammatic.) B = cut end of sigmoid implanted in abdominal wall. D = peritoneum sutured separately. E = muscle layer and mucous layer of stump of rectum sutured.

divided about one inch below the recto-sigmoid junction, and the lower half of the sigmoid with the upper part of the rectum removed (see Figure VIII).

5. The mucous and muscle layers of the rectum were closed with catgut sutures, and the peritoneal edges approximated by a separate layer of sutures. A potential space was thus left between the peritoneal layer and the sutured stump of the rectum. A tube was inserted down to the sutured rectum.

6. The cut end of the proximal segment of the sigmoid was sutured into a small split-muscle opening in the left iliac region. When the patient had recovered from the operation the left colon segment was washed out from the transverse colostomy.

7. Two months later, when the peritoneum had grown on to the rectum and most of the inflammation associated with a healing wound had subsided, the patient was reoperated upon and the abdomen again opened. The terminal end of the sigmoid was dissected out of the abdominal wall and implanted into the

stump of the rectum by the same technique as the ileum in the second case was telescoped into the rectum (see Figure V). A drainage tube was placed near the anastomosis. In this cramped situation the suturing was difficult, but any defective suturing was not of great importance, because both of the bowel segments were functionless.

8. Three weeks later, when the anastomosis had firmly united, the spur of the transverse colostomy was crushed by a specially constructed enterotome (see Figure IX).

9. One week later, under local anæsthesia, the artificial anus was dissected out and closed, as in step 13 in the first case discussed.

The subsequent history of the patient is that he is now quite well and has normal function.

In this case the alternative was to remove the lower half of the sigmoid with part of the rectum, close the divided end of the rectum, and to leave the patient an artificial anus. But in this particular case the patient was mentally not quite normal, and would not have been able to look after an artificial anus.

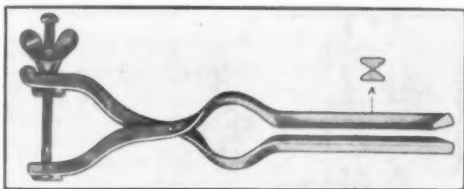


FIGURE IX. Enterotome with bevelled edges, used for crushing the spur. (Reproduced by courtesy of *The Lancet*.)

Summary.

When it is necessary to remove the whole sigmoid for extensive carcinomatous disease or for diverticulitis, it is still possible to restore normal function by: (a) anastomosing the lower part of the ileum to the rectum, and connecting the proximal and distal ends of the residual colon to the abdominal wall by mucous fistulæ; or (b) connecting the middle of a dependent transverse colon to the rectal stump.

A transverse colon not dependent enough to unite to the recto-sigmoid junction may become so after extra function imposed on it by an artificial anus at the lower end of the descending colon.

When it is necessary to resect the lower part of the sigmoid and some of the upper part of the rectum, an end-to-end anastomosis can be safely carried out if done in stages and if the left side of the colon is thrown temporarily out of function.

Case Reports.

FOUR CASES OF PITUITARY TUMOUR.

By SIR CARRICK ROBERTSON,
Auckland.

DURING the past three months four patients with pituitary tumours have been operated on in the Auckland Hospital. As the number of cases seems large in proportion to the population, it is possible that there is a tendency in New Zealand to develop adenomata of the pituitary just as there is a strong tendency to develop adenomata of the thyroid.

It is hoped that a description of, and commentary on, these four cases may draw attention to a condition which has been regarded hitherto as somewhat rare. Their surgical treatment has little risk and the results are almost dramatic.

Before describing the individual cases, it must be emphasized that the fortunate results obtained were made possible only by having the assistance of the ophthalmologist, the radiologist and the physician, and by having the skilled help of the rhinologist when operations were performed by the nasal route.

As the eye signs are of such great importance in the diagnosis, it will not be out of place to recall the position of the optic chiasma in relation to the pituitary body and diaphragm. De Schweinitz states that in 96% of bodies the chiasma is located wholly or partially over the *diaphragma sellæ*, and is separated from it by a space of three to ten millimetres. In the large majority of cases the stalk of the pituitary gland emerges just anterior to the chiasma. It will be evident that any enlargement upwards of the hypophysis will press on the chiasma from below and near its anterior edge, thus destroying or putting out of action the fibres going to the nasal sides of the retina, which is shown by a loss of vision in both temporal fields. The earliest loss will be in the upper and outer quadrant of the field. However, although this is the typical lesion, De Schweinitz states that it occurs in only about 60% of cases. Variations in the relative anatomy of the parts will cause variation in the parts of the chiasma involved. For example, he records 6% of his patients as having homonymous hemianopia.⁽¹⁾

CASE I.—Mrs. H., aged thirty-six years, was born in New Zealand. In the previous eighteen months she had had severe vertical headaches with an occasional feeling as if she were about to lose consciousness. The symptoms increased in severity this last two months. The menses during the last six years were more frequent (every twenty-one days) and lasted longer than before. Pelvic examination revealed an old perineal tear, a retroversion of the uterus and a prolapsed left ovary. An X ray examination of the skull, made in Sydney by Dr. B. P. Anderson Stuart, showed that the portions of the frontal and parietal bones on either side of the sagittal suture were considerably denser and thicker than normal and the bony overgrowth was particularly well marked on the inner aspect of the cranium. The appearance suggested a condition of hyperostosis probably of pituitary origin. The pituitary fossa was large and deep, but within normal limits. The pineal body was not displaced. The meningeal markings on the inner table of the skull were well marked, suggesting the possibility of a slight chronic rise of intracranial tension. The paranasal sinuses were clear.

The Wassermann test yielded no reaction. No abnormality was discovered on neurological examination. In view of these findings, an eminent gynaecologist had suggested a pelvic operation and treatment of the headaches with pituitary gland. A further set of X ray films was taken by Dr. Gwynne, of Auckland, and it then seemed that the pituitary fossa was a little larger than normal (see Figure I). If this were caused by a tumour of the pituitary gland, some signs of pressure on the optic chiasma should be found, so the patient was sent to Dr. Goldstein, who reported that the fundi were normal, but that there was a definite, though slight, contraction of both temporal fields (see Diagram I).

We now had three definite signs of pituitary involvement: increased size of the *sella turcica*, bitemporal hemianopia, alteration of menses, and, in addition, very severe headaches. On this evidence it was decided to do transsphenoidal decompression of the sella. Chloroform and oxygen were given by the intrapharyngeal method by Dr. Kirker. Dr. Borrie and I did a submucous resection of the *septum nasi* through a Killian intranasal incision. Enough septum was



FIGURE I. Showing *sella turcica* in Case I.

removed to expose thoroughly the sphenoidal sinus. The anterior wall of the sinus was then broken away and the sella was seen bulging downwards. The floor of the sella, thus exposed, was removed and on opening the *dura mater* there was a considerable flow of fluid as if a cyst had been opened. Owing to the mixing of the fluid with blood exuding from the walls of the wound, none was obtained for laboratory examination. Neither could any soft tissue be scraped out of the cavity. It seemed as if the whole sella must have been filled with a thin-walled cyst, probably a broken-down adenoma.

The patient left the hospital in a fortnight. She has had no more headaches; the menses have returned to the type of six years previously, the bitemporal hemianopia diminished (see Diagram II), and she feels better in every way.

The interest in this case lies in the fact that, had it not been for the bitemporal hemianopia discovered on investigating the fields of vision, it is possible that a pelvic operation would have been performed and the pituitary swelling left until vision had begun to fail seriously. The importance of having the fields of vision examined in every suspected case of intracranial pressure, whether of pituitary origin or not, cannot be too strongly emphasized. The ophthalmological signs in the surgery of brain tumours very often prove the most important aid in locating their position.

CASE II.—Miss B., aged about fifty years, was under the care of Dr. Johnson. She complained of failing sight for about a year. The patient "thought she had astigmatism" for some years, but during the last year her sight became pro-

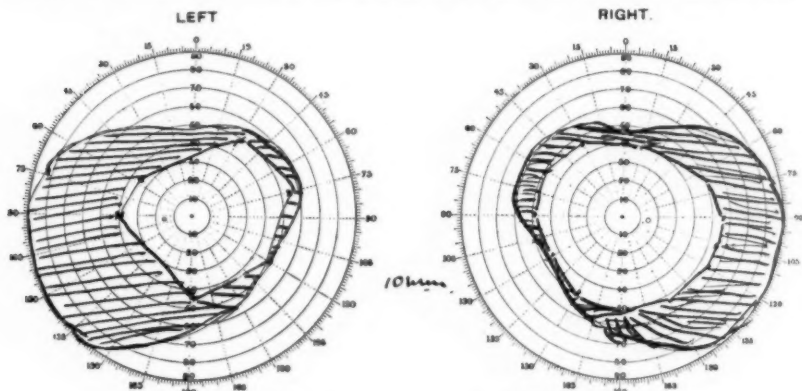


DIAGRAM I. Case I, perimeter chart before operation.

gressively worse, the right eye being blind except for perception of light, and the left bad enough to make reading impossible. She could not go out without a companion to lead her. For some years she had been troubled with symptoms pointing to the likelihood of gall stones; otherwise she had been perfectly well. She had amenorrhœa since she was thirty-six years of age. The only neurological signs were a slight increase in the deep reflexes and a deviation of the tongue to the left. There were no headaches.

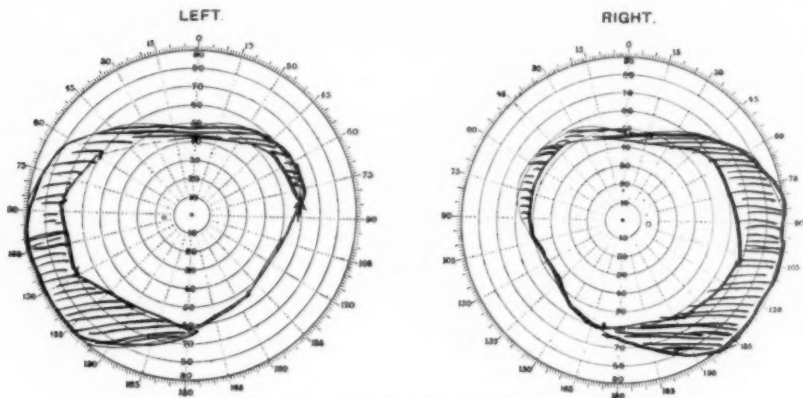


DIAGRAM II. Case I, perimeter chart five weeks after operation.

Ophthalmological examination by Mr. W. A. Fairclough revealed in the right eye atrophy of the nerve head. The pigment proliferations at the periphery of the disk pointed to secondary atrophy. Vision was restricted to the perception

of hand movements. The findings in the left eye were the same as in the right, but less pronounced. Vision was $\frac{6}{60}$. The field of vision in the left eye showed complete loss of temporal field and some contraction of the nasal field also (see Diagram III).

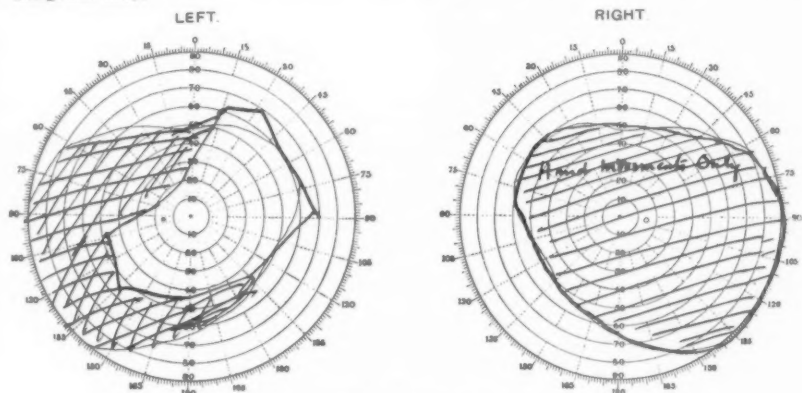


DIAGRAM III. Case II, perimeter chart before operation. $V = \frac{6}{60}$.

X ray examination revealed definite enlargement of the *sella turcica* (see Figure II). The same operation was performed by Dr. Borrie and myself as in Case I. The sella proved to be larger and the bony floor thinner than in the

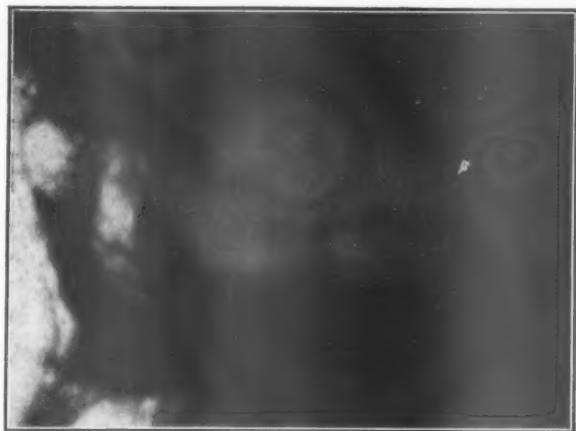


FIGURE II. Showing *sella turcica* in Case II.

previous case, so that a larger piece was removed. Soft adenomatous tissue was removed with a curette.

Eighteen days after the operation the eyes were again examined by Mr. Fairclough, who reported that the vision in the left eye was $\frac{6}{24}$; this represented

a definite improvement, and a slightly larger field of vision. Continued improvement took place, and four weeks later this patient, who had been so blind that she had to be led about, was able to read the newspaper and go about in traffic without help.

CASE III.—Miss M., aged thirty-nine years, who was under care of Dr. Johnson, came because of falling sight, increase in weight and painful subcutaneous lumps. All of these had developed in the last three years, but the sight had always been poor, as she has conical corneæ. Her mother and one sister had died of tuberculosis and one sister has goitre. About three years ago the sight of the right eye began to fail and her weight to increase by about 25.2 kilograms (four stone). During this time there had been almost complete amenorrhœa. The hands, feet and jaws showed no enlargement.

A report by Mr. W. A. Fairclough was that with the right eye, vision was restricted to the perception of fingers at half a metre on the nasal side of the optical axis only, that is, not on the temporal side; thus probably some time

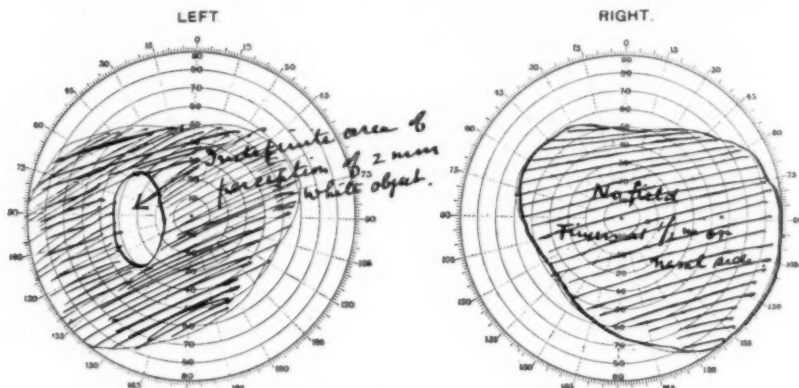


DIAGRAM IV. Chart III, perimeter chart on July 8, 1931, before operation.

ago the patient had a temporal hemianopia (see Diagram IV). The optic disk was atrophic. In the left eye there was some general contraction and a definite gap in the upper temporal field. The findings pointed to tumour of the pituitary body.

X ray examination was carried out by Dr. Gwynne. He reported a definite generalized enlargement of the pituitary fossa. The floor of the fossa was intact. The anterior and posterior clinoid processes were indistinct. These findings were compatible with the presence of an intrasellar tumour (see Figure III).

The patient was referred for operation, which took place on July 14, 1931. Local anæsthesia was used together with ether given intratracheally by Dr. Hudson. A similar transsphenoidal operation was performed by Dr. Borrie and myself. Owing to the thickness of the bone in the septal region, there was more difficulty than in the previous cases in removing the anterior wall of the sphenoidal sinus. The left sinus was larger and lower than the right, and the sella was seen bulging into this region. With a chisel a large piece of the anterior wall of the pituitary fossa was removed, the thickened white *dura mater* being exposed. When the *dura mater* was incised a pair of Luc's forceps was inserted into the fossa and small pieces of tumour were removed, which Dr. Gilmour reports to be a chromophobe adenoma.

A month after the operation, Mr. Fairclough reported "quite extraordinary improvement in the fields". In the left eye the temporal gap had practically gone; in the right eye, which had no field before operation, there was a good nasal

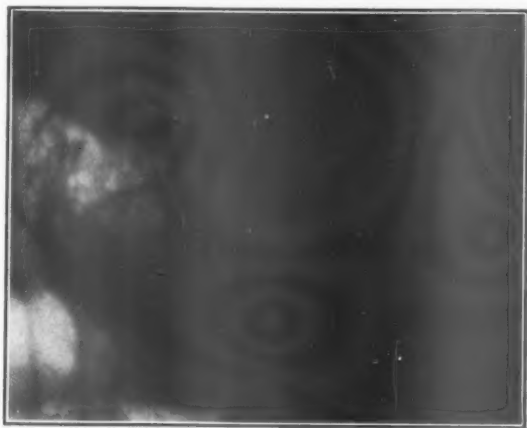


FIGURE III. Showing *sella turcica* in Case III.

field, some temporal field and islands of vision in temporal defect, which made further improvement likely (see Diagram V).

The patient said that she saw better than she had seen for twenty-four years. She has had no more painful subcutaneous nodules.

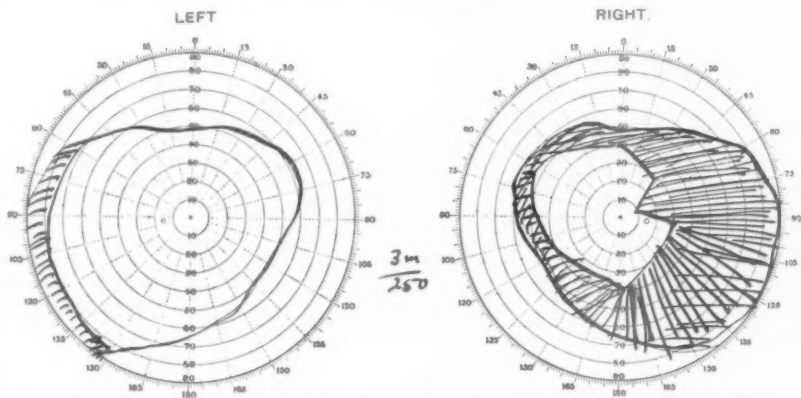


DIAGRAM V. Case III, perimeter chart on August 15, 1931, five weeks after operation.

CASE IV.—Miss McK., aged thirty-eight years, had in the last five months been subject to attacks of frontal headaches lasting several hours. The first attack was followed by severe vomiting. Vision in the left eye had always

been poor, but no difference was noticed of late. The patient had complained of amenorrhœa since the age of twenty-one years. At this time she began to increase in weight. She dated the last-mentioned symptoms from an attack of mumps, but this attack was not severe enough to keep her in bed.

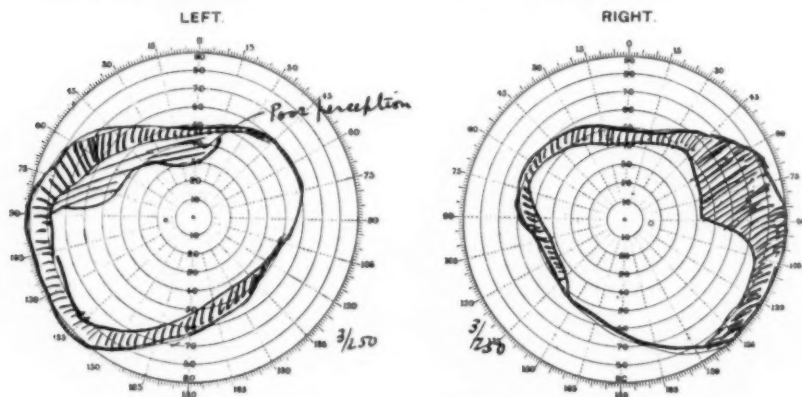


DIAGRAM VI. Case IV, perimeter chart before operation.

On examination, she was obese, with rather prominent facial features. She was mentally alert. Ophthalmological examination by Mr. Fairclough revealed the fundi of both eyes to be normal, but a small contraction of the temporal fields of vision (see Diagram VI).

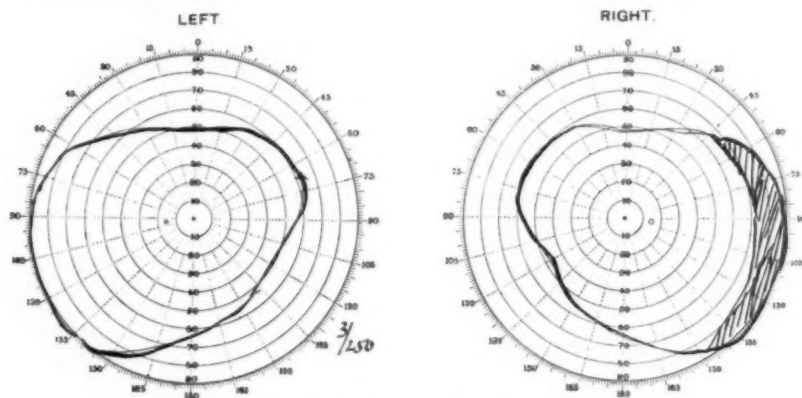


DIAGRAM VII. Case IV, perimeter chart four weeks after operation.

Radiological examination by Dr. Gwynne revealed an irregular decalcification of the floor and posterior clinoid processes of the *sella turcica*, compatible with the presence of a tumour in this situation (see Figure IV). The general appearance of this patient rather suggested some pituitary origin for the headache, which the X ray examination and defective temporal fields of vision confirmed.

Under ether anaesthesia induced by the intratracheal method by Dr. Hudson, a transsphenoidal operation was done by Dr. Borrie and myself. When the bone was removed from the floor of the sella, venous oozing made it very difficult to proceed. Eventually the *dura mater* was incised, a pair of long forceps was pushed into the opening, and small pieces of tumour were removed.

The patient left the hospital in about ten days. Four weeks after operation Mr. Fairclough reports a complete recovery in the left field and a much improved right eye field (see Diagram VII). She has lost her headaches.

Two of these four patients had no headache. In a series of twenty cases of hypophyseal adenomata mentioned by Beckman and Kirbie headache was present in seventeen.⁽²⁾

It is interesting to note that the degree of optic atrophy was much more pronounced in the patients with no headache. It was for blindness that they sought advice, whereas in the two patients who sought advice for headache, the loss of temporal vision was discovered only on careful ophthalmological

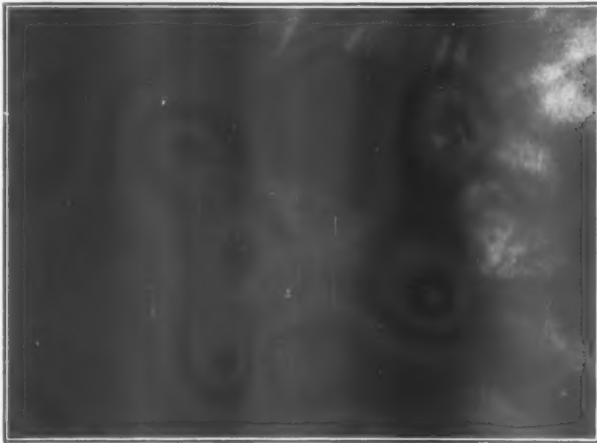


FIGURE IV. Showing *sella turcica* in Case IV.

examination. The patients all showed some menstrual disturbance, which is characteristic of all forms of pituitary disease in the female.

The operations were all performed by the nasal route and were in the nature of a decompression. The whole tumour was not removed, as it is doubtful what would happen if the sella was completely emptied of its contents, and Harvey Cushing has pointed out that any future growth of the tumour left behind will extend downwards into the nose, where it does no harm. He holds that an average of seven years' freedom from symptoms results. The operation can then be repeated if necessary.

There is conflicting evidence as to the results of total extirpation of the hypophysis in animals. We have had a fatality in an unsuspected adenoma of the pituitary gland, and at *post mortem* examination death was found to be due to a hæmorrhage into the substance of the gland, thus causing its complete destruction. Cushing quotes cases of fatal cachexia due to destruction of the gland by morbid processes (adenomata).

In comparing the operation from below (transsphenoidal) with the operation from above (transfrontal), it should be noted that the transsphenoidal leaves no

disfigurement, upsets the patient very little, gives rapid relief of pressure on the chiasma and, in Cushing's hands, has a mortality of only 5%.

The transfrontal operation can cause permanent injury to vision, as it is difficult to remove the growth from the neighbourhood of the chiasma without injuring it. It is also more dangerous, as injury to the hypothalamic region is often followed by death. It must be seldom that it is possible to remove the whole growth.

However, all cases of pituitary tumour cannot be reached by the nasal route, for besides the adenomata of the pituitary gland there are other tumours in connexion with this body, notably the growth or cyst, which occurs in connexion with Rathke's pouch. This obviously cannot be safely reached from below, as it is above the sellar roof.

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- ⁽¹⁾ C. H. Frazier: *Surgery, Gynecology and Obstetrics*, Volume XL, 1925, page 876.
⁽²⁾ Beckman and Kirbie: *Brain*, Part 2, Volume LII, page 127.

TIC DOULOUREUX OF THE GLOSSOPHARYNGEAL NERVE.

By LEONARD H. BALL,

Emergency Surgeon, The Alfred Hospital, Melbourne.

TIC DOULOUREUX of the glossopharyngeal nerve is a clinical entity, the characteristics of which are not generally appreciated. The following history of a patient who came under treatment in October, 1930, exemplifies the condition and indicates a relatively simple form of treatment.

Clinical History.

A woman, aged forty-two years, complained of severe shooting pains in the left side of the neck lasting a few seconds. The paroxysms varied greatly in frequency; sometimes they occurred at intervals of ten minutes during day and night, but were commonly brought on by eating. Further inquiry elicited the fact that the pains commenced in 1916, but the spasms were not so severe then as now. She had had intervals of freedom from the pain for two or three months, but one intermission lasted for six years (1920-1926). Recently the paroxysms had become more severe, the pain had radiated to the left ear and the attacks were always associated with a secretion of thick saliva into the throat.

Examination of the nose and throat revealed nothing abnormal and no neurological signs were obtainable, although the pulse was quickened during attacks of pains. The Wassermann test yielded no reaction.

In November, 1930, the patient was admitted to hospital and kept under observation. During this time the attacks were fairly frequent and were uninfluenced by large doses of sedatives, such as aspirin, phenacetin, gelsemine and morphine.

Operation was performed after three weeks' medical treatment. A vertical incision was made along the anterior border of the sterno-cleido-mastoid muscle in the upper third of the neck. The glossopharyngeal nerve was isolated and two centimetres (three-quarters of an inch) were excised. This procedure is not difficult, but care must be taken not to divide the hypoglossal nerve in error. If it is remembered that the hypoglossal nerve passes superficial to the external carotid artery, whilst the glossopharyngeal nerve is deep to it, this mistake will not occur.

For about a week afterwards the lump" on the left side of the pharynx,

patient complained that she "felt a but since then she has had no subjective phenomena, although she has an anaesthesia of the left side of the posterior third of the tongue and pharynx. Taste is unaffected on the anterior two-thirds of the tongue, but there is apparently some gustatory sensation present in the posterior third of the affected side.

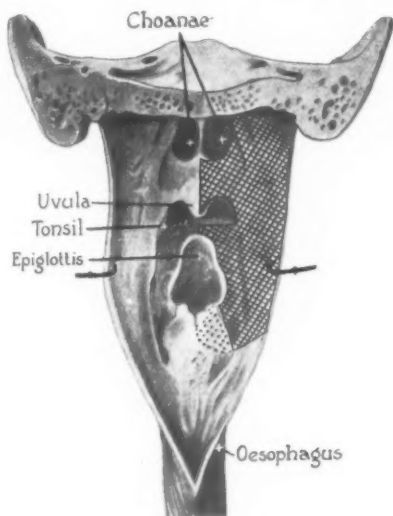


FIGURE I. The pharynx viewed from behind with posterior wall removed, showing the area supplied by the glossopharyngeal nerve (after Dandy).

the vagus nerve supplying the posterior part of the external auditory meatus. Jacobson's nerve enters the tympanum and takes part in the formation of the tympanic plexus. The glossopharyngeal nerve is the secretory nerve to the parotid gland, and it would appear that these branches would be responsible for the salivation which is so common in these attacks. Martin⁽³⁾ points out that pain behind the auricle is probably due to nerve fibres going with the auricular branch of the vagus, but that pain anterior to the ear can be explained only on the supposition that some of the parotid fibres are sensory or that in neuralgia there is an overflow of stimuli within the common somatic sensory nucleus of the medulla which gives pain referable to the face.

Comment.

The pain of *tic douloureux* of the glossopharyngeal nerve may commence in the tonsil, posterior third of the tongue, pharynx or ear, and stimulation of any one of these regions may precipitate an attack.

The diagrams show the sensory distribution of the glossopharyngeal nerve.

Patients usually have a dread of swallowing, and Dandy⁽¹⁾ has observed that cold fluids are more potent in producing the pain than hot. The frequency with which pain is referred to the ear is rather surprising. Harris⁽²⁾ reports the case of a woman who had been afraid to wash her ear for some years for fear of initiating a paroxysm of pain. The petrous ganglion of the glossopharyngeal nerve gives a communication to the auricular branch of

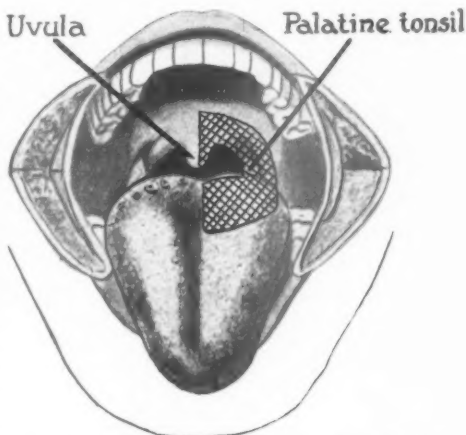


FIGURE II. Diagram of the mouth showing the extent of sensory supply of the glossopharyngeal nerve to the tongue and soft palate (after Dandy).

Remissions, as in *tic douloureux* of the fifth cranial nerve, would appear to be typical of this condition. Adson⁽⁴⁾ had a patient who was free from symptoms for three and a half years, and the present patient was without pain for over six years.

For the diagnosis of *tic douloureux* of the glossopharyngeal nerve two conditions are necessary: (i) The pain must be in the area supplied by the nerve (see Figures I and II). (ii) There must be no demonstrable cause for the neuralgia, that is, it must be idiopathic.

It is noteworthy that Harris⁽²⁾ in his first three cases of this condition did not recognize them as such, but mistakenly injected the third division of the fifth cranial nerve, with, of course, no abatement of the pain. This mistake would be especially liable to occur when the auricle is involved.

Although geniculate neuralgia is rare, yet it may be confused with the glossopharyngeal lesion; but the pain of the former condition is not precipitated by swallowing, does not radiate to the throat, and is usually associated with facial paralysis and preceded by a herpes of the ear.

Dandy⁽¹⁾ in his collection of twenty cases reported in the literature up till 1927, found that two patients had a tumour of the cerebello-pontive angle and three carcinoma of the tonsil. A careful examination will exclude these conditions. Fonio⁽⁵⁾ reports a case of glossopharyngeal neuralgia caused by an aneurysm of the common and internal carotid arteries.

Operative treatment of this condition was first undertaken by Sicard⁽⁶⁾ in 1920, when, in addition to cutting the glossopharyngeal nerve in the neck, he divided the pharyngeal branches of the vagus and cervical sympathetic, due, doubtless, to a lack of appreciation of the sensory nerve supply of the pharynx. In 1923 Doyle⁽⁷⁾ divided the glossopharyngeal nerve in the neck, but in 1924 Adson⁽⁴⁾ evulsed the nerve in order, if possible, to destroy the nerve above the petrous ganglion, and so to prevent any possibility of the regeneration of the nerve. Later Harris⁽²⁾ attempted to inject the nerve where it leaves the skull through the jugular foramen and was successful in one case.

Dandy⁽¹⁾ in 1927 performed an intracranial operation in three patients and divided the nerve proximal to the ganglion. He used the posterior route, elevated the cerebellum and exposed the cerebello-pontive angle where the nerve is seen about one centimetre caudal to the auditory nerve.

Conclusions.

1. *Tic douloureux* of the glossopharyngeal nerve is a definite though uncommon condition in all ways comparable to a similar condition of the fifth cranial nerve.

2. Treatment is by division of the nerve, either in the neck or intracranially.

3. As division of the nerve cures this condition it would appear that we have here a method of treating the intractable pain due to malignant disease of the tonsil or pharynx.

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- ⁽⁵⁾ A. Fonio (quoted by Murray): "Ein Fall von Glossopharyngeusneuralgie," *Deutsche Zeitschrift für Chirurgie*, Volume CCVII, 1928, page 325.
- ⁽⁶⁾ R. Sicard and Robineau (quoted by W. E. Dandy): "Algie vélo-pharyngée essentielle; traitement chirurgical," *Revue Neurologique*, Volume XXVII, 1920, page 256.
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AN UNUSUAL BREAST CASE.

By E. T. CATO,
Melbourne.

A PATIENT consulted me on February 21, 1927. She was a married woman with one child. She had had a miscarriage one year before the birth of this her only child. The infant was weaned after nine months.

For the six years preceding her visit to me her left breast had been gradually increasing in size. Lactation had been more plentiful in the left breast. The great increase in bulk of this had taken place since she commenced to suckle her baby.

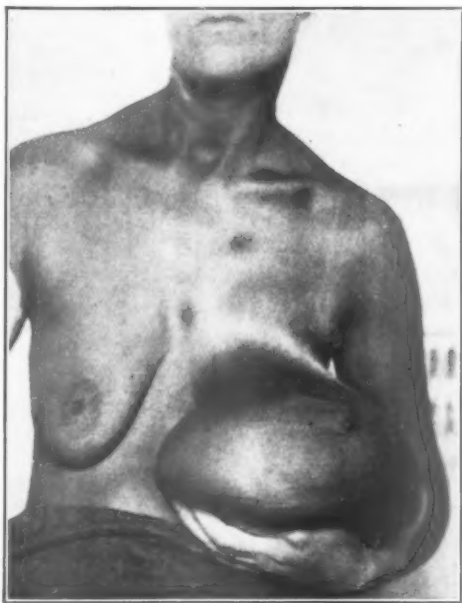


Figure showing tumour of the breast.

On examination the patient had a large hypertrophied left breast, its surface covered with dilated veins; it was about the dimensions of a large football.

There were no palpable glands in either axilla and no discharge from either nipple. The breast was freely movable on the deep structures and exhibited a definite axillary tail which is evident in the accompanying photograph. The right breast was apparently normal. Otherwise a general examination revealed no abnormality, save that the patient's left arm was exceedingly strong and its muscular development remarkable as compared to the right; this is ascribed to the fact that she had actually carried this breast on her arm for four or five years.

At operation the left breast alone was removed, and a small breast was fashioned from fat and skin. The organ weighed 3.8 kilograms (eight pounds and a half). This was a case of Brodie's serocystic tumour.

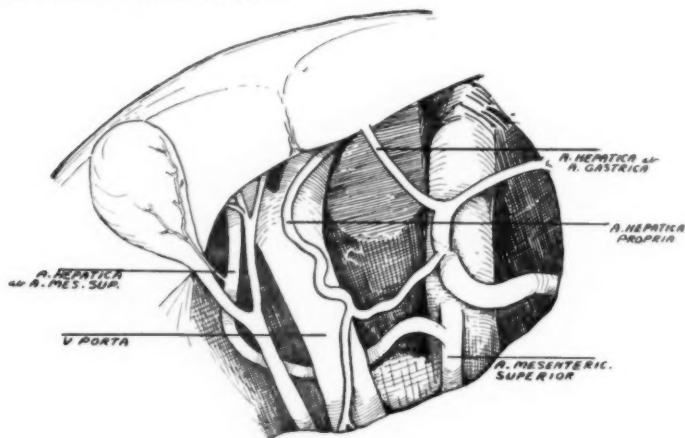
The patient at the present time is enjoying excellent health.

AN ABNORMAL RIGHT HEPATIC ARTERY.

By JOHN TURNER,

Stewart Lecturer in Anatomy, University of Melbourne.

ALTHOUGH the abnormalities of the hepatic artery have been exhaustively surveyed by many investigators, notably Pedro Belou, P. de Rio-Branco, Pierre Descomps and Flint, the following case presents certain factors of surgical importance that deserve attention.



The accompanying diagram represents the condition as found in the dissecting room. It will be noted that the normal hepatic artery arose from a very short celiac axis, and, after passing along the upper border of the pancreas, turned upwards between the two layers of the gastro-hepatic omentum lying in front of the portal vein and to the left side of the common bile duct and the hepatic duct. It entered the under surface of the liver at the extreme left border of the *porta hepatis* without giving a branch to the right lobe. The left lobe of the liver was also supplied by a vessel which arose from the left gastric artery, entering it to the left side of the normal hepatic artery.

The abnormal hepatic artery arose from the superior mesenteric artery near its origin, and passed to the right behind the portal vein and common bile duct. It then turned upwards deep to the cystic duct, being visible in the angle between the cystic and common bile ducts, lying in the fold of peritoneum passing from the neck of the gall bladder to the free border of the gastro-hepatic omentum. Just above the cystic duct the cystic artery was given off, passing along the upper surface of the gall bladder. Finally it entered the right lobe of the liver at the extreme right border of the *porta hepatis*. It was larger in size than the true hepatic artery.

Discussion.

Hepatic arteries with a similar origin from the superior mesenteric artery have been reported, but this case presents two interesting features.

First, the course of the vessel in the angle between the cystic and common bile ducts would render it liable to injury at operation, especially when the cystic duct was being exposed by cutting the small peritoneal fold passing from the neck of the gall bladder to the right free border of the gastro-hepatic omentum.

Secondly, as there is no cross connexion of circulation between the right and left sides of the liver in a line running through the fossa for the gall bladder, the abnormal hepatic artery alone supplied the right side. Accidental severance of a right hepatic artery without apparent ill effect has been reported more than once. Nutrition is maintained to some extent by portal blood, and later there is a compensatory hypertrophy of the left lobe. Nevertheless, it is considered that, especially in the presence of previous bile duct obstruction, severance of such a vessel may throw further strain on a liver already inefficiently functioning.

Reference.

The standard reference on this subject is Pedro Belou, "*Anatomia de los Conductos Biliares y de la Arteria Cystica*", Buenos Ayres, 1915.

UNIVESICULAR HYDATID CYST OF THE KIDNEY.

By RICHARD FLYNN.

[From the Department of Surgery, University of Sydney.]

RETROPERITONEAL cysts of all types are exceedingly rare, and the history here reported illustrates the difficulties of their accurate pre-operative diagnosis in spite of the fullest investigation.

The patient, Mrs. V.D., aged twenty-one years, was first seen on February 18, 1931, when she complained of a swelling in the right side of the upper part of the abdomen, which had been present for six years. There was nothing relevant in her family history. She had had no previous illness and no miscarriages, while her menstrual periods had been regular, the last occurring three weeks before she was seen. She had been married twenty-six months and had one child, sixteen months of age, not yet weaned.

The patient had first noticed at the age of fifteen a firm painless swelling in the right side of the abdomen, just below the ribs, but as it caused her no discomfort, she disregarded it. During the puerperium she noticed the lump increasing in size, but at no time was there any pain or tenderness. She sought relief because she was worried about the increase in size of the swelling.

On examination she appeared a healthy young woman. Palpation in the right upper abdominal quadrant revealed a globular cystic mass, which was dull to percussion, this dullness being continuous with that of the liver. The cyst moved with respiration, measured apparently about 6.25 centimetres (two and a half inches) in diameter, and, as it did not extend into the right loin, did not give the impression that it was renal in origin. No other abnormality was detected in her physical examination, nor was anything abnormal detected in her urine.

A provisional diagnosis was that the condition might be hydatid cyst of liver, hydrops of the gall bladder, simple cyst of the liver, in this order of probability.

A fluoroscopic examination of her thorax on February 23, 1931, showed that the right side of the diaphragm was not elevated, and that both sides of the diaphragm moved freely and equally. The Casoni intradermal test on February 24, 1931, gave no reaction. On February 23, 1931, a bismuth meal was given, and

the radiologist reported as follows: "The stomach is displaced markedly to the left, and there is a pressure deformity of the greater curvature close to the pyloric end; no actual intrinsic lesion could be detected in the stomach or duodenum." The skiagram is reproduced in Figure I.

For domestic reasons the patient neglected to report for six weeks, and at this examination the swelling was much larger than formerly. It was easily possible to insinuate the hand between the mass and the anterior border of the liver, and there was a tympanitic area over its medial aspect. The clinical signs suggested that it was connected with the kidney, as it could be palpated bimanually with ease, and extended well back into the loin. It now measured at least 12.5 centimetres (five inches) in diameter and a fluid thrill was obtained.



FIGURE I. Radiograph after ingestion of bismuth meal, showing gastric distortion due to a right sided tumour.

intravenously, appeared in normal time, the blue being strongly and equally concentrated on both sides. Microscopical examination of specimens of urine from both right and left kidneys revealed neither pus nor blood. A right sided pyelogram and ureterogram showed some dilatation of the renal calyces and ureter, with some slight rotation of lower renal pole towards the mid-line. The right ureter was shown to be displaced well to the left of the mid-line (see Figure II).

The conclusion arrived at after studying the pyelogram and ureterogram, along with the clinical findings, was that the cyst was extrarenal and retroperitoneal. It had evidently displaced the kidney and ureter, causing some ureteric obstruction with a consequent mild degree of hydronephrosis and hydroureter. To

On April 20, 1931, a radiographic examination of the urinary tract revealed "no urinary calculus or other abnormality". Microscopical examination of a catheter specimen of urine revealed no pus nor blood, while the results of the blood urea and urea concentration tests were well within normal limits. On cystoscopic examination the bladder was found to be perfectly normal, with normal ureteric orifices. Both ureters were catheterized; the left catheterization was easily performed, but there was considerable difficulty in the passage of the catheter in the right ureter, although no definite block was encountered. Indigo-carmin, injected

ALLAN TO VINU
LOPPEZ JACOBIN

confirm the clinical findings of a tympanitic area medial to the cyst and to demonstrate the relation of the mass to the ascending colon, the patient was sent for radiological examination after a bismuth enema, with the request that antero-posterior and lateral views be taken. The report was that the ascending colon was pushed over to the right of the tumour (see Figure III).

At this stage it had been definitely determined that the cyst was retroperitoneal in position, but the possibility of an hepatic origin had not been excluded, so the patient was sent for cholecystography. This showed that the gall bladder filled well and that it appeared normal in function, but that it was displaced upwards, and had assumed a horizontal position, being moulded over the superior surface of the cyst (see Figure IV).

This excluded hydrops of the gall bladder and demonstrated that the cyst was below the liver and probably not derived from it. The Casoni intradermal test for hydatid disease gave no reaction on two other occasions, on April 14, 1931, and May 23, 1931, while the Wassermann test also gave no reaction. The complement fixation test for hydatid disease was not carried out. The blood count on May 30, 1931, revealed 11,900 leucocytes per cubic millimetre; the neutrophile cells were estimated at 59.9%, lymphocytes 38.5%, monocytes 1%, eosinophile cells 5%, basophile cells 5%; no definite eosinophilia was observed in films.

On May 22, 1931, further physical examination revealed a very large visible cystic swelling, extending from the right costal margin down into the right hypogastric and lumbar regions and well over into the epigastrium, and moving well on respiration. It was not tender and felt tensely cystic; a thrill was obtained on two occasions, but the vibration did not seem to be sufficiently marked, and disappeared too rapidly to be called a typical hydatid thrill. The rest of the abdomen was soft, no masses being palpable and no tenderness being detected. The final pre-operative diagnosis was retroperitoneal cyst, congenital in type, probably of Wolffian duct origin, or hydatid cyst. The evidence in favour of the former was: (i) the size of the cyst, together with the patient's age and sex; (ii) its comparatively rapid growth under observation and the repeated failure of reaction to the Casoni test. The tenseness of the cyst, the suggestive thrill and the comparative frequency of hydatid disease, however, were rather in favour of its being a parasitic cyst.

The patient was operated upon under ether anaesthesia induced by the open method. The usual kidney incision was made. On cutting through the *fascia transversalis* a large cystic mass was exposed. On exploration it was found to be connected with the lower pole of the right kidney, but did not involve the kidney

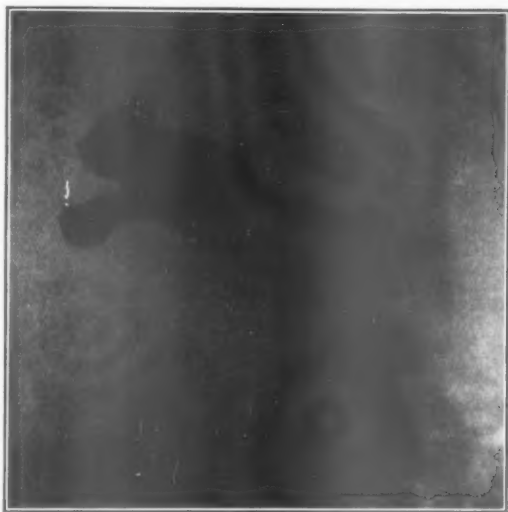


FIGURE II. Pyelogram, showing displacement of pelvis of kidney and right ureter.

substance very deeply, not more than a centimetre or two. It was packed off, a small needle attached to a syringe was inserted and a few cubic centimetres of clear fluid were aspirated. This was thought to be hydatid fluid, and the manner in which the capsule merged with the kidney also supported this view. Dew's three-way needle was introduced and a 10% solution of formalin was injected into the cyst. This was allowed to remain for a few minutes while the needle was still in place, and the cyst was then allowed to empty slowly. As the cyst became empty a small piece of laminated membrane presented alongside the needle puncture, while the intermittent nature of the evacuation suggested a temporary block of the needle by a piece of collapsed cyst.



FIGURE III. Radiograph after bismuth enema, showing displacement of the ascending colon to the left.

When the cyst was nearly empty, it was partially delivered through the incision and incised, when it was found to be a typical univesicular hydatid cyst. The parasitic membrane was then gently drawn out with sponge forceps and the adventitia was carefully explored to eliminate the presence of other loculi. After being mopped out, it was then sewn up and dropped back into the cavity, the wound being sutured in layers in the usual way without drainage.

The patient was returned to the ward in good condition, and, after an uneventful convalescence, was discharged from hospital three weeks later with the wound soundly healed.

Discussion.

The operative findings explain the physical signs and give a ready interpretation to the X ray photographs.

The displacement of the stomach and duodenum to the left is readily explained by the presence of a large hydatid cyst in the lower pole of the kidney, while the fact that the hydatid involved only the cortex of the kidney explains the absence of filling defect in its lower calyx. The displacement of the ureter and the rotation of the lower pole of the kidney nearer to the mid-line, along with the difficulty in the introduction of a catheter into the right kidney, are also explained by the position of the cyst. The X ray picture of the colon and of the gall bladder demonstrated very well the position of the cyst in relation to these structures.

The cyst was large, but univesicular, the usual finding in so young an adult. The chemical examination of the hydatid fluid collected at operation revealed a very high percentage of albumin (2%), which is positive evidence of an ineffective laminated membrane with leakage of serum into the contents of the cyst. Death and degeneration of the scolices had occurred, and this was also evidence that the laminated membrane had become effete, allowing entry of host protein and the production of unsatisfactory conditions for scolical survival. On consideration of the patient's history there was, however, no evidence pointing to previous anaphylactic symptoms due to absorption of hydatid protein.

Especially interesting was the repeated failure of reaction to the Casoni intradermal test. This may have been due to the use of inert hydatid fluid in the performance of the test or possibly to desensitization of the patient by slight leakage from cyst. In this case it is probable that the hydatid complement fixation test would have given a positive reaction.

The apparent rapid growth of the cyst during the puerperium and while the patient was undergoing investigation, may have been more apparent than real. It is possible that at the first examination the cyst was still within the perirenal fascia, the physical findings at that time agreeing with this assumption, but that during the period of her absence the cyst forced its way through this restraining barrier and was able to expand rapidly in the loose structure of the retroperitoneal tissues, so filling the loin and displacing the colon, as is so well shown in Figure IV.

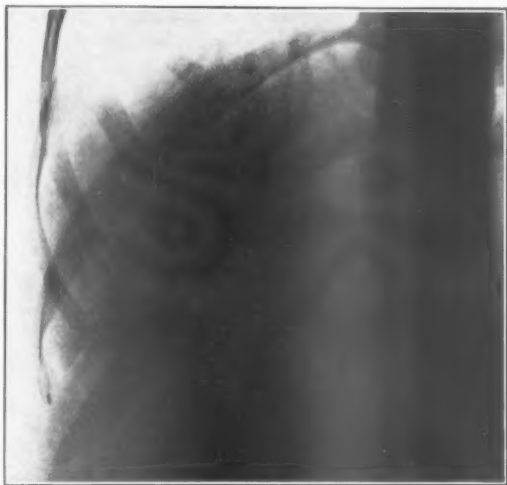


FIGURE IV. Cholecystogram, showing position assumed by the gall bladder on the superior surface of the cyst.

Surgery in Other Countries.

[In this column will be published short résumés of articles likely to be of practical value from journals published in other countries and not readily accessible to surgeons in Australia and New Zealand.]

SCHMIEDEN'S OPERATION FOR INGUINAL HERNIA.

IN *Der Chirurg*, September 15, 1931, Professor V. Schmieden, Chief of the University Surgical Clinic at Frankfurt, writes on the technique of his operation for inguinal hernia and on the "follow-up" results of one hundred and eight cases. The technique he gives is as follows:

1. Incision and exposure of the cord and the sac as in Bassini's method.
2. Blunt dissection of the testicle out of the scrotum, double ligation and sharp division of the *gubernaculum Hunteri*. (The ligature threads are left long so that in the replacing of the testicle they can be knotted together.)
3. Isolation and ligation of the hernial sac in the usual way.

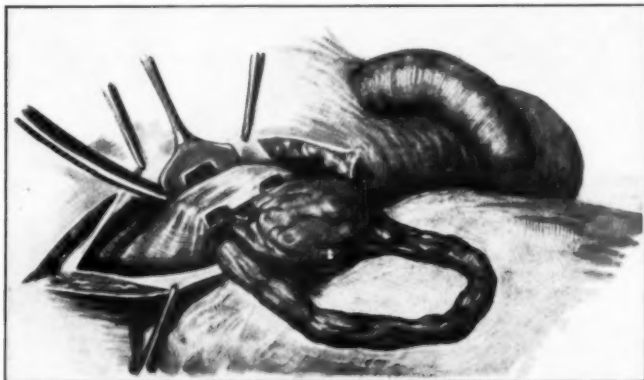


FIGURE I. A strip of muscle (internal oblique and transversalis) is separated from the peritoneum and lifted up. The cord with the testicle is drawn through a button-hole opening made in the muscle.

4. The lower edge of the internal oblique and transversalis muscles is now lifted up from the peritoneum, and, about two to three centimetres above this, a closed scissors is passed through the muscles from behind forwards. The blades of the scissors are opened in the direction of the muscle fibres, so as to make an opening which extends almost to the rectus sheath.

5. The testicle is drawn through this opening as in Figure I. The size of this opening is now reduced by catgut sutures so that the cord is firmly surrounded by the muscles, but not compressed.

6. An exact repair of the inguinal canal is now begun in the lower angle of the wound. A strong silk suture is used to unite the lowest part of the rectus

sheath to the strong periosteum on the pubic ramus. This suture is important and should be placed with especial care; it takes the tension off the hernial pillars and makes the lower edge of the oblique muscle lie naturally in contact with the inguinal ligament (see Figure II).

7. The lower edge of the internal oblique and transversalis muscles is united in its whole length to the inguinal ligament.

8. The testicle is replaced in the scrotum and the ligatures, which were left long, are knotted together. A most careful hæmostasis is especially necessary in the scrotum.

9. The external oblique muscle is sutured.

A "follow-up" examination was carried out in one hundred and eight cases. In six of these the hernia was direct. Forty-eight operations were done under

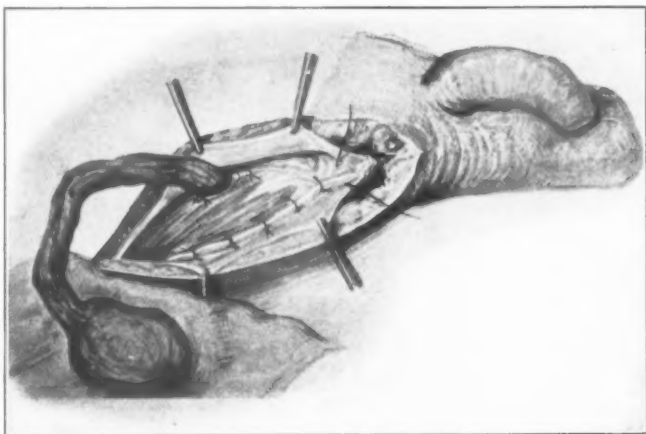


FIGURE II. The old hernial opening is closed by the formation of a solid posterior wall to the inguinal canal. The series of sutures which fixes the lower edge of the internal oblique and transversalis muscle to the inguinal ligament is shown.

general anaesthesia, twenty-nine under lumbar anaesthesia, and twenty-five under local anaesthesia. Lumbar or local anaesthesia was used for old people. Seventeen scrotal hæmatomata occurred. These absorbed quickly and required no special treatment. Some atrophy of the testicle occurred in four patients, all of whom were over fifty years of age. Recurrence occurred in 6.75% of patients. A careful analysis of these recurrences showed that there was some definite reason for the recurrence: one patient had very weak tissues; one was a very fat man; in another the recurrence took place through the new opening in the internal oblique muscle. These results compare favourably with statistics taken out for recurrences after the Bassini operation, for which the figures are 8% to 12% for indirect hernia, and 12% to 15% and even up to 25% for direct hernia.

Schmieden claims for this method the following advantages: (i) easier isolation and management of the hernial sac; (ii) better hæmostasis; (iii) an uninterrupted view of the anatomical conditions of the whole of the inguinal triangle; (iv) an exact coaptation of the whole length of the free muscle edges with the inguinal ligament can be carried out without any regard to the cord.

In the experience of the reviewer, this method would appear to have certain advantages. In old people, whose hypotonic muscles are a much greater factor

in the formation of hernia than a preformed sac, it is possible to carry out a more faithful repair of the posterior wall of the inguinal canal than by Bassini's method. In direct hernia this method facilitates the carrying out of any plastic method for effectively closing the hernial opening in the abdominal wall.

Its disadvantages are that there is a certain amount of traumatism in displacing the testicle, and compression of the cord may take place from scar formation following healing of the artificial opening that has been made in the internal oblique and transversalis muscles.

H. B. DEVINE.

THE SERUM TREATMENT OF PERITONITIS.

HUBERT KUNZ, of Gratz, Austria, writing in *Zentralblatt für Chirurgie*, November 8, 1930, states that the high mortality in the operative treatment of peritonitis following perforated acute appendicitis makes it clear that renewed efforts must be made to improve results.

The latest development in the treatment of appendiceal peritonitis is the employment of serum. Since Katzenstein some three years ago recommended the use of a *Bacillus coli* antitoxic serum for peritonitis and reported good results, some surgeons have followed his example and give encouraging reports. At Katzenstein's clinic the coliserum has been used in over one hundred cases, and it was reported that a number of the most dangerously ill patients, whose condition was apparently hopeless, could be saved, and that a large proportion of patients with equally severe peritonitis could be comparatively quickly cured. Kunz himself has tried this serum and has several times been convinced of its value, but only in a limited number of cases.

He recalls that Löhr at the Surgical Congress of 1928, as a result of the important bacteriological investigations of Zeissler on anaerobes, stressed the theory that in peritonitis arising from the colon the presence and the toxic effects of anaerobic gas-forming bacilli must be reckoned with, and that the grave danger to life in peritonitis is for the most part produced by the toxic effects of these organisms. He reviews the investigations that had already been made concerning the anaerobic flora in the normal and diseased appendix. For instance, Veillon and Zuber could demonstrate the *Bacillus perfringens*. Heyde in twenty-six cases of acute appendicitis found anaerobic bacilli in 98%. These findings were confirmed by many investigators. Löhr and Rassfeld have found up to three or four types of anaerobic bacteria in perforated gangrenous appendicitis. In France, Weinberg and his school in particular have carried out similar investigations. By reason of these findings, Kunz holds with Löhr that it is no longer practicable to ignore completely the question of anaerobes in the treatment of appendiceal peritonitis. He states that in France a polyvalent gas gangrene serum is widely used in the treatment of appendicitis—the so-called anti-gas gangrene serum which is manufactured at the Pasteur Institute according to Weinberg's formula.

Kunz quotes from Weinberg's reports that in Nancy, Michel and Mathieu treated thirty-five patients with gangrenous appendicitis with this anaerobic serum, curing thirty-two; that is, 91.5%. According to Weinberg, the anti-gas gangrene serum is of course effective only when the appendix is infected by one of the anaerobes, particularly the *Bacillus perfringens*. To increase its effect, the anti-gas gangrene serum in accordance with the bacteriological findings is given combined with other sera, for example, an anti-colon or an anti-streptococcal serum. He calls attention to Weinberg's view that it is not essentially necessary that the combined serum should contain antibodies for all the infecting organisms, since it often suffices to overcome the dominant infecting organism in order to destroy the associated bacteria. It is said too that the serum has produced improvement in those cases of acute appendicitis in which the bacteriological examination could reveal none of the anaerobes against which the sera were directed. It would thus appear that the injection of serum has also an unspecific effect.

Reporting on the use of serum for peritonitis in German speaking countries, Kunz recalls that Löhr and Zeissler in 1928 stated with regret that there was no serum at that time produced in Germany to equal the Weinberg serum. But at the present time the Behring Laboratories supply a serum similar to that recommended by the Pasteur Institute. In addition, there is the "Höchst" anaerobe serum which contains antibodies against the same four anaerobes and, in addition, anti-toxins against the tetanus bacillus.

Although endeavours have been made to prove the value of anaerobic sera in the treatment of appendiceal peritonitis, reports on the use of the serum have not appeared hitherto in German literature. Kunz therefore approached the Höchst Laboratories with the recommendation that they should produce a combined serum identical with that employed by Weinberg, but containing also an antitoxic coli-serum. An experimental serum was produced composed of equal parts of Katzenstein's colon serum and anti-gas gangrene serum. The coli-serum is produced from filtrates of selected toxic *Bacillus coli* colonies and the gas gangrene serum contains antibodies against *Bacillus welchii* (*Bacillus perfringens*), *Vibrio septique*, *Bacillus oedematis* and *Bacillus histolyticus*.

This Höchst peritonitis serum has been used in thirty-seven cases of peritonitis following perforated appendices: twenty-one were cases of severe diffuse peritonitis, the remaining sixteen were from the first in a more favourable condition, but even in these the entire peritoneal cavity was infected. When the peritonitis was localized and the perforations were recent, serum was not used. Drainage was used in all cases, in the most severe cases after a previous lavage of the peritoneal cavity with saline solution. Of these thirty-seven patients four died. Of these four deaths three were due to a very severe purulent peritonitis with a paralytic obstruction of the intestine at the time of operation. The fourth patient had a perforated retrocaecal appendix and as the condition was localized, no serum was given after the operation. On the fourteenth day symptoms of diffuse peritonitis were present. At the *post mortem* examination the cause of the peritonitis was found to be a perforation of the caecum following a circumscribed necrosis of its wall. It was self-evident that serum therapy was useless in this instance.

The dosage of the serum employed was 25 cubic centimetres given intravenously and 50 cubic centimetres intramuscularly. In children and adults with milder infections less serum was used. Many times the intramuscular injection alone was employed. The serum was diluted with saline solution before use. In severe cases the dose of serum was repeated on the third and fourth day after the onset of the disease. Only once was a light "serum rash" reported.

Besides these thirty-seven cases of appendiceal peritonitis, the serum was used in another instance in which diffuse peritonitis supervened two days after an operation for an intraperitoneal perforating injury of the rectum. After two injections of serum the symptoms of peritonitis completely disappeared. Kunz admits that the number of cases treated is too small to draw definite conclusions as to the value of serum treatment. It is, however, certain that the effect of the serum was favourable. It was often surprising how good the general condition of the patient was even on the day of operation after the first injection of serum. The effect of the serum was striking in those cases characterized by very toxic symptoms. The favourable results of serum treatment were also shown by a comparison with patients suffering from perforated appendices in the same clinic who were operated on and not treated with the "peritonitis serum". There were forty-eight of these patients, of whom thirteen died—a mortality of 27%. This may be contrasted with thirty-seven serum-treated patients, of whom four died—a mortality of 10.8%. It must be considered, too, that in the forty-eight cases not treated with serum there are included those in which no general peritonitis was present, while in the serum-treated cases serum was employed only when there was widespread peritonitis. Kunz concludes that serum treatment must be considered only as a help to other surgical measures; it can never vie with the necessary surgical interference nor make operation superfluous.

F. F. D'Arcy.

Reviews.

PATHOLOGY FOR GYNÆCOLOGISTS.

A MONOGRAPH on gynæcological pathology by A. E. Hertzler has just appeared as one of a series of works on surgical pathology, some of which have already been published.¹ It presents in a compact form a wealth of material. The book is most attractively set up, and its illustrations are uniformly excellent. It should be of greatest value to the advanced student.

Each section is divided into two parts. The first is the text, which relates the personal experience of the writer; the second is the bibliography, which is not only given in some detail, but is critically reviewed by the writer. This arrangement makes the book valuable both to the busy practitioner, who will find those conditions which he will encounter most frequently well dealt with in the text, and to the student, who will find the literature which will be most useful to him.

The omission here and there of some special feature or condition is disappointing, but the explanation is to be found in the preface. The author states: "The effort has been to present in this little book only the things that I have seen and the end results of which I know." The value of such a work needs no emphasis.

Proceedings of the Royal Australasian College of Surgeons

ANNUAL MEETING.

THE annual meeting of the Royal Australasian College of Surgeons was held at Melbourne on February 17, 1932. An account of the inaugural meeting and of the business meeting was published in the last issue of this journal.

HOSPITAL DEMONSTRATIONS.

Hospital demonstrations were held at the Melbourne, the Alfred and the Saint Vincent's Hospitals.

Melbourne Hospital.

VICTOR HURLEY operated on a female patient, aged twenty-one years, who for two years had had a tumour in the neck and nervousness and tremor for six weeks. The basal metabolic rate was +48%. The patient was prepared for operation by giving Lugol's solution 0.6 mil (ten minims) three times a day, and "Luminal" 0.03 gramme (half a grain) at night. Ten days later the basal metabolic rate was +7%. A subtotal thyroidectomy was performed under nitrous oxide anaesthesia. After the operation the patient was given Lugol's solution 2.0 mils (thirty minims).

W. A. HAILES showed a patient, aged fifty years, in whom a carcinoma of the tongue, involving the floor of the mouth in the neighbourhood of the tonsil, had

¹"Surgical Pathology of the Female Generative Organs", by A. E. Hertzler; 1932. Philadelphia: J. B. Lippincott Company. Royal 8vo., pp. 346, with 285 illustrations.

been treated by radium implantation four months previously. The mouth lesion was now healed, showing a supple scar. There was free movement and function, but a hard gland was palpable in the superior deep cervical chain opposite the angle of the mandible.

A block dissection of the superior deep cervical lymphatic area was carried out. Under anaesthesia induced by the intratracheal method the skin flaps were outlined by two incisions, one running from 2.5 centimetres (an inch) below the mastoid process to the cornua of the hyoid bone, thence curving to the submental region. The second incision ran along the anterior border of the sterno-mastoid muscle from the point where the first incision crossed this border, to the clavicle. A block dissection was then made in the usual way.

ALAN NEWTON gave a lecturette, illustrated by lantern slides, on the technique of cholecystectomy. He then demonstrated the operation on a woman, aged twenty-seven years. The patient had had an attack of acute cholecystitis. This was allowed to subside before operation was attempted. Ether was the anaesthetic used. A right paramedian incision was made, and a circular self-retaining retractor was inserted. The operation area was displayed by using soft copper retractors to keep the intestines out of the way. The gall bladder was removed by first isolating and then dividing the cystic duct and artery, and then separating it from the liver along the subserous plane. A drainage tube was placed in the gall bladder bed down to the duct, and the peritoneum sewn over it. The tube was brought out through the wound.

C. W. B. LITTLEJOHN demonstrated a case of Codman's bursitis in a male patient aged forty-eight years. There had been trauma to the right shoulder three months previously, since when pain was present on forward movement and on raising the arm from the side. Under ether anaesthesia an incision was made along the deltoid-pectoral sulcus, and the greater tuberosity was exposed. A greatly enlarged and extensive bursa was found which was removed as far as possible and, by means of a chisel, six millimetres (a quarter of an inch) of the great tuberosity were also removed. The patient's arm was then placed in an abduction splint. On examination of the bursa it was found to contain numerous villi.

C. W. B. Littlejohn also showed a male patient, aged thirty-three years, who was suffering from sacro-iliac strain. This patient complained of pain in the right sacro-iliac region radiating down to the lateral aspect of the ankle. Twenty-one weeks after an injury all movements on leaning to the left in the standing position were limited by pain. Raising the left side caused pain in the right sacro-iliac joint and down to the left ankle. Under ether anaesthesia an arcuate incision was made over the right sacro-iliac joint. The joint was exposed, a window of bone removed, the cartilage removed, and the joint curetted. A graft was then wedged in.

JOHN T. TAIT demonstrated a case of carcinoma of the bladder in a patient aged sixty-four years. There had been frequency of micturition for six months and also haematuria. At first the blood was seen at the end of the act of micturition, but later, for the last three months, it was present throughout. There had been a dull ache in the left groin for the last six weeks. Cystoscopic examination had demonstrated a large non-villous growth in the posterior portion of the bladder above the left extremity of the trigone. Three papillary secondary growths were also seen. Operation was then performed and the bladder was opened. The growth was excised, and in doing this it was necessary to cut the left ureter. The cut end of the ureter was then implanted into another part of the bladder wall. The tumour was subsequently shown by microscopical examination to be a transitional celled carcinoma.

JULIAN SMITH, JUNR., demonstrated a hydatid of the liver in a female patient aged fifty years. There had been operations on two occasions—twenty-four years and twelve years previously. She had had a dull aching pain under the right costal margin for six years, general lassitude for two months, and swelling in the right hypochondrium (gradually becoming larger) for two months. Hydatid complement fixation test gave no reaction, but the Casoni test gave a "+++" reaction. Under ether anaesthesia the cyst was approached by a Kocher's incision. The abdominal cavity was packed off, the cyst opened, and many

daughter cysts were removed. The cyst was then swabbed with pure formalin, then with normal saline solution. The wound was closed without drainage.¹

The Alfred Hospital.

BALCOMBE QUICK demonstrated the use of skin grafts as an-aid to the healing of cavities associated with chronic osteomyelitis. The patient, a female, aged sixty years, had had an osteomyelitis of the ulna for several years, during which time she had had several operations on the bone. The wound was opened and the bone retunnelled so that there was a healthy base. Thiersch grafts were taken from the thigh and applied to the cavity. These grafts were kept in position by dental wax inlays.¹

JOHN KENNEDY performed the operation of perineal excision of the rectum in a male, aged fifty-nine years. This patient had hæmorrhoids for eight to ten years, and bleeding from these for six months. Colostomy was performed sixteen days before operation. The patient was placed in the "jack-knife" position; that is, lying on the face with the pelvis raised and the lower portion of the table dependent. Two cubic centimetres of an 8% solution of a spinal anæsthetic with ephedrine were given. It was demonstrated that this position gave ready access to the upper part of the rectum and the peritoneal cavity, but that separation of the rectum from the urethra was more difficult than with the patient in the lateral position. During separation of the coccyx the periosteum was raised on the anterior and posterior aspects, so that this could be joined to cover over the end of the sacrum. This was said to prevent some of the post-operative pain which occurs in such cases. The bowel was removed by the diathermy knife, and thirty milligrammes of radium were placed in fascial planes.²

H. C. COLVILLE presented patients on whom he had operated for non-descent of the testis. In one of these the first stage of the operation had been carried out only a few weeks previously. In the other two it was possible to show that a very good result had been obtained. In these two the second stage had been completed twelve months previously. In both cases the testes were in the scrotum.

DR. J. R. ANDERSON gave a short discussion on detachment of the retina. First some macroscopical specimens were shown, illustrating the close association and attachment of the vitreous to retina at the *ora serrata*. A specimen of cystoid degeneration was shown, and it was suggested that the condition was physiological in later life. Dr. Anderson said that retinal tears probably arose from the pull of the vitreous on a degenerate part of the retina at or near the *ora serrata*.

Dr. Anderson then showed a series of illustrations depicting the various types of retina hole and tears, and briefly showed the fields of vision of some patients recently operated upon. The method of localization of the holes was discussed. Several cases of retinal detachment were shown.

A detailed description of a case of cerebral tumour was then given. This case was illustrated by the fields of vision at varying stages, which could be correlated with the *post mortem* findings.

DR. T. A'B. TRAVERS then gave a brief outline of abnormal retinal correspondence, and stressed its importance in the treatment and prognosis of concomitant squint. The methods by which abnormal correspondence arises were discussed, and the treatment of the condition was outlined.

Saint Vincent's Hospital.

H. B. DEVINE gave a lecturette, illustrated by lantern slides, on unsuccessful gastro-enterostomy. He pointed out that modern investigation had shown that unsuccessful gastro-enterostomies were often found associated with a follicular gastritis. The macroscopical characters of this disease were discussed, and

¹ Balcombe Quick reports that several weeks later the cavity is epithelialized in part, and definitely healing.

² Convalescence was uneventful except that the patient suffered from retention of urine.

instances were given to illustrate how this disease could produce the symptoms of gastric or duodenal ulcer. A series of slides was also shown to illustrate the various mechanical defects in the placing of the stoma and the afferent and efferent loops which caused gastro-enterostomy to be a failure.

H. B. Devine then demonstrated in a female patient the steps of the operation for the undoing of an unsuccessful gastro-enterostomy. Adhesions between the viscera and the anterior abdominal wall were divided under sight by elevating the abdominal wall with his special abdominal retractor. The gastro-enterostomy was isolated by working through an opening in the gastro-colic omentum. An incision in the stomach, running round the stoma, 1.25 centimetres (half an inch) from the line of gastro-intestinal union, was made. This left sufficient of the wall of the stomach attached to the jejunum to enable the opening in it to be closed without producing any stricture. A patch of "ulcer gastritis" was demonstrated on the margin of the stoma. This, the operator pointed out, was the immediate forerunner of a jejunal ulcer.

Particular attention was paid to the repair of the peritoneum of the anterior abdominal wall, any rents caused by the separation of adhesions being most carefully sutured.

C. G. SHAW showed a male patient, aged twenty-nine years, who had, during ten years, six attacks of locking of the right knee joint. There was slight effusion and limitation of extension. Tenderness was present over the external semilunar cartilage. Exploration was made through a longitudinal incision fifteen centimetres (six inches) in length with splitting of the patella. The knee joint was investigated. The lateral meniscus was shown to have a hæmorrhagic area midway between the anterior and posterior ends. No other abnormality was present. The meniscus was dissected free and removed. After suture, the limb was placed on a back splint.¹

C. G. Shaw showed a second patient in whom non-union of the tibia and fibula had continued for two years and four months, even though a grafting operation had been performed fifteen months after injury. This operation was of the sliding inlay bone graft variety. X ray examination six months later demonstrated that no attempt at callus formation had occurred. Owing to blueness, coldness and swelling of the limb, periarterial injection of alcohol into the sheath of the femoral artery in Hunter's canal was undertaken in the hope that osteoblastic activity might be stimulated. Two months later the general condition of the limb was greatly improved, but there was no evidence of callus formation. The patient had been walking in a plaster cast with crutches. Six weeks later both ends of the tibia were drilled and, under local anæsthesia, 1.25 centimetres (half an inch) of the fibula were removed. After three months there was still no attempt at bone formation. All forms of investigation revealed no adequate cause for this non-union. The question of amputation was now discussed, but it was decided to reexplore the site of fracture.

Under general anæsthesia, the bone ends were found to be quite smooth and covered with fibrous tissue (pseudo-arthritis). A piece of bone 1.25 centimetres (half an inch) in length was sawn off and healthy bone was exposed. The bone ends were split longitudinally with an osteotome to the depth of 2.5 centimetres (an inch), 2.5 centimetres of the fibula were removed, and the split ends of the tibia were impacted. The limb was placed in a plaster splint.²

LEO. DOYLE showed a series of pyelograms illustrating some of the common pathological lesions met with in the renal tract. Films illustrating hydronephrosis, tumour, calculus, tuberculosis, polycystic disease *et cetera*, were shown. One film illustrated a type of pelvic deformity resembling in its irregularity the appearance of a pyelogram caused by a neoplasm, but which was bilateral and present in a healthy patient. He remarked that a series of similar pyelograms had recently

¹ Seven days later movements were commenced. On the tenth day the patient was discharged to convalescent hospital. Extension of knee was full and flexion almost complete.

² Seven weeks after operation there was still no evidence of bone reaction or callus formation.

appeared in the literature, and that the general consensus of opinion was that the condition was congenital and of no pathological significance.

Leo. Doyle also showed a series of normal pyelograms to illustrate the extreme variations in size and shape possible in the normal subject.

J. N. MORRIS presented four cases of osteomyelitis of the femur.

The first was that of a male, aged sixteen years. After injury the condition was thought to be traumatic synovitis of the knee, but with development of pyrexia and chest signs it was regarded as miliary tuberculosis. With increased swelling and pain of the knee and the discovery of early X ray signs suggesting subacute osteomyelitis, the knee was explored and pus obtained. At this stage it was difficult to exclude radiologically Ewing's sarcoma.

The second case was that of a male, aged eight years. There was a history of injury twelve months before, followed by limping and pathological fracture of the neck of the femur six months later. Drainage was established, and two months later sequestrectomy of the head of the right femur was performed.

The third case was that of a male, aged twenty years. An osteomyelitis of the right femur had been drained three years previously. A discharge had persisted for two years. After being healed for twelve months there was a return of symptoms and a swelling of the scar following another injury.

The fourth case was that of a male, aged eighteen years, who, six years previously, had undergone an operation on the lower end of the femur for osteomyelitis. A sinus had persisted to date. X ray examination revealed a cavity and sequestrum; the sequestrum was removed at operation.

J. N. MORRIS also showed a male patient, aged eighteen years, who was suffering from multiple Brodie's abscesses. Two years previously the patient was operated on for subacute osteomyelitis of the right fibula. He now presented himself with the signs and symptoms of traumatic synovitis of the knee. He became febrile. X ray examination revealed a Brodie's abscess in the head of the tibia. While still attending for treatment, he complained of pain in the right shoulder after a small injury. X ray examination revealed a Brodie's abscess. This was opened and drained. He now had similar abscesses in the heads of both fibulae which had formed sinuses.

F. F. D'ARCY showed a female patient, aged twenty-four years, who had had three attacks of pain and swelling in the middle of the right thigh at intervals of one year. There was a history that nine years previously she had had an infected finger and there was pain and swelling of the thigh at this time. Radiographic examination suggested a chronic inflammatory condition, but did not exclude neoplasm. Wassermann and hydatid complement fixation tests gave no reaction. It was considered that a lesion in the middle of the shaft of a long bone was more likely to be a chronic inflammatory condition or a secondary deposit from neoplastic diseases elsewhere rather than a primary growth of bone. Stiffness of the knee which was present, was due to fixation of the quadriceps muscle, suggesting an inflammatory lesion rather than a neoplastic development, where the muscles were lifted off the bone and their function was little impaired. Osteotomy was carried out under general anaesthesia and a small sequestrum of bone removed without drainage. Subsequent history was an uneventful recovery.

F. F. D'ARCY also presented a case of congenital bilateral dislocation of the patella. He said that only about fifty cases of this condition were reported in the literature. The patient was a woman, aged fifty-two years, who began to walk late and who had frequent falls. As a result her knees were frequently cut. Operation for fixation of the knees at the age of eleven years was refused. She married, had twelve children, and in spite of disability did all her own housework, and at one time took care of forty boarders. None of her children had reproduced her abnormality, and there was no history of a similar condition amongst her ancestors.

Clinical examination showed that rudimentary petallae were present on the outer sides of the condyles of the femur. There was an associated subluxation of the tibia on both sides. This was confirmed by X ray examination.

